ENERGY USE IN TRANSPORT DATA REPORT

BECA CARTER HOLLINGS & FERNER
Auckland

NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE

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This is a report of work carried out under NZERDC Contract 3114. It contains data and the appendices. Previous reports published on this contract (Policies for Medium and Long-Term Savings in Transportation) include Publications P38, P49, and Reports 65 and 80. A summary report will be published. The opinions expressed are those of the authors and are not necessarily endorsed by the Committee.

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C O N T E N T S

ENERGY USE IN TRANSPORT : DATA REPORT

ABSTRACT

This document presents data on transport and energy use for 1984 calendar year with time trends. It updates NZERDC Report No. 27 which provided similar information for 1975.

A large amount of research has been carried out since the original report which has filled gaps in the statistical data base. In some cases this indicates the need for revision of the original data tabulations.

As with Report No. 27, the approach taken has been to successivly disaggregate global data using published and unpublished official statistics, surveys and research reports. Data sources have been compared and matched so as to provide an internally consistent set of tabulations. It must be noted that the quality of data is not uniform and that consequently some parts of the analysis are more reliably established than others.

The report is laid out in summary form with supporting tables and appendices.

1. INTRODUCTION

1.1 Purpose

This report reviews the use of fuel in powering transport vehicles. It updates and extends information previously presented in NZERDC Report No. 27. The energy inputs to vehicle manufacture and transport infrastructure are not included, although these are known to be of similar magnitude to direct (fuel) energy.

1.2 Data Sources and Analysis

These are detailed in the appendix volume. Transport energy data are gathered from many sources and the differences in geographic coverage, definitions of vehicle type and operation, and time period have to be reconciled. This is not a straightforward process and involves assumptions and approximations.

1.3 Data Classification

The data are classified:

(a) temporally, by calendar year
(b) spatially, by statistical area
(c) sectorally by N.Z. Standard Industry Classification

Subdivisions within these categories are also used.

1.4 Time Series and Cross Sectional Data

Time series data are derived mainly from offical sources. For such data to be useful there must be consistency of definition, and regular and reliable coverage. However, it is not always possible to precisely match time series data with cross-sectional data. Cross-sectional data frequently rely on special surveys, often on a sample basis, which are either not repeated or, only infrequently repeated because of the cost involved.

Time series data are useful in reviewing trends whereas cross-sectional data are useful for detailed studies of energy use by particular transport vehicles or transport operations. Full cross-sectional data cannot easily be generated on a regular basis. Typically the surveys on which cross-sectional data rely are carried out at three to five year intervals.

1.5 Main Features of Energy Use in Transport

Petrol (gasoline), LPG (liquefied petroleum gas), CNG (compressed natural gas), and aviation kerosene (avtur) are almost entirely used in powering vehicles. A large proportion of light diesel oil is also used in either on- or off-road vehicles (and most of the remainder in stationary engines).

Road transport absorbs the majority of transport fuel consumed within New Zealand. A large amount of fuel, mainly diesel oil, is consumed in off-road vehicles engaged in agriculture, forestry and construction. Rail, coastal shipping, and domestic aviation continue to be relatively minor energy users in comparison to road transport.

The overall pattern of use changes only slowly. Influencing factors are:

- LPG and CNG inroads into the petrol market.
- improving fuel efficiency through combustion technology, electronic fuel monitoring and control, and vehicle downsizing.
- continued replacement of petrol trucks by diesel.
- changes in transport volume arising from changes in economic activity and population gain.
- continued increase in the number of registered private vehicles per head of population and changing annual travel per vehicle.

1.6 Fuel Use in Domestic and International Transport

Supply of fuel within New Zealand to international shipping and aviation accounts for substantial quantities of fuel. However, the transport energy attributable to N.Z. overseas trade and personal travel is not accurately reflected in these supply statistics, nor in the fuel energy purchases by N.Z. air and sea transport flag carriers.

The total fuel attributable to international transport is that used in moving goods and people between New Zealand and overseas origins and destinations. Part of this is reflected in direct purchases of fuel in New Zealand dollars and part in the purchase of transport services.

The amount of fuel attributable to New Zealand's share of international transport to and from New Zealand is of similar order of magnitude to the fuel used in transport within New Zealand.

2. ROAD TRANSPORT

2.1 Introduction

The stock of cars, motorcycles and light commercial vehicles continues to increase on a per capita basis as well as in total. Numbers of heavy commercial vehicles do not show the same degree of change. Public transport vehicles also show little change with the exception of an increase in tour buses. Rental vehicle numbers are also increasing.

Petrol supply is primarily to cars and light commercial vehicles, and is predominantly on-road. It is relatively straightforward to attribute fuel usage to different vehicle types. An indistinct boundary lies between household and commercial ownership and use, an area in which data are still incomplete.

While the vehicle stock has increased, petrol usage has levelled off. This is attributed primarily to a reversal of the early 1970's trend towards larger engine sizes to the use of diesel fuel in heavy vehicles and also to a continuing improvement in unit fuel consumption through advances in automative design. Traffic counts show a low rate of growth through the late 1970s but growth has picked up again in the last few years.

LPG and CNG have started to take an appreciable share of the petrol market.

Transport fuel use by on-road vehicles breaks down as follows:

	Petrol	Diesel
cars	71	0
light commercial	19	1
heavy commercial	5	74
buses	1	3
taxi and rental	2	0
motorcycles	1	0
other	1	22
	100	100
petrol/diesel composition	81	19

Petrol includes gas fuels in the above table.

2.2 Cars

The national car fleet continues to grow both in absolute terms and on a per capita basis. Average car size in terms of engine capacity has reduced from the mid-1970s but appears to have reached a minimum and now show signs of a slow rise; there has been a trend towards more flexible passenger/luggage compartment arrangements and an increasing proportion of the fleet is classed as either hatchback or stationwagon.

Average vehicle age reduced from 1960 to a minimum of 8.5 years in the mid-1970s but has since risen.

With the trend towards lighter, smaller cars, fuel economy as recorded in standard tests, has increased. There is also evidence that fuel economy has improved within classes of vehicle size and mass.

In this report more attention has been given to the distinction between business and private (household) owned cars. Although this distinction is not a clear one and data on the subject are imprecise, it appears that business cars comprise some 20% of the car fleet.

Business cars are more likely to be purchased new than household cars and they occupy approximately half of new sales. Their utilisation is higher than household cars and this accentuates the declining utilisation with vehicle age which is quite marked. There is also some correlation between utilisation and vehicle size, large cars having higher utilisation on average.

CNG and LPG now take appreciable through still minor proportions of the market. There has not been any marked inroad by diesel fuel.

Car use forms 57% of on-road use of fuel with business vehicles accounting for 15% of this total and private vehicles 42%.

2.3 Light Commercial Vehicles

There has been a rapid growth in the numbers of light commercial vehicles in recent years. Average size (for vehicles under 2 tonnes) is similar to that for cars. Statistics indicate that CNG and LPG have made greater inroads to the light commerical fleet than for cars, about 10% now being gas fuelled. Diesel fuel is on the increase but is less frequent than CNG.

Light commercial vehicle utilisation averages 16,000 km/year which puts it well above the car fleet, though similar to the business car sector.

Fuel use in light commercial vehicles forms 15% of on-road use of fuel.

2.4 Heavy Commercial Vehicles

A survey of Certificates of Fitness conducted in 1977, subsequent Road User Charges returns, and several surveys of sections of the fleet, now provide a better base of data for the fleet composition and usage by gross weight, motive power and type of operator.

No new data has been assembled regarding vehicle load factors but unit fuel consumption is now more reliably obtained from research into mechanistic models of vehicle operation.

Fuel use has been derived from annual kilometres of travel by gross weight category using payload assumptions as in NZERDC No. 27. Fuel use attributable to heavy trailers has been calculated separately, in direct proportion to gross tonne kilometres of travel.

The total fleet size for heavy vehicles shows relatively slow annual growth. Within the total there is a continuing preference to replace petrol vehicles with diesel in the higher gross weight categories. There has been a rapid turnover of heavy vehicles during the last few years and the average age of the fleet has reduced substantially.

While fleet size has remained relatively stable there has been a change in the distribution of gross vehicle weights towards heavier vehicles.

Licensed road transport now takes a larger share of total road freight travel volume and vehicle utilisation for licensed transport is significantly higher than for ancillary operations.

Heavy commercial vehicles use 18% of on-road transport fuel of which 14% is diesel and 4% petrol.

2.5 Buses

Bus numbers, mileage and fuel consumption have not changed significantly in recent years. The numbers of tour buses have grown, there has been a gradual shift towards diesel power, and numbers of electric trolleys have reduced further. CNG is being used in the Palmerston North urban fleet.

New information on passenger loadings has led to these being revised downwards with a reduction in energy efficiency (passenger-kilometres/litre).

Fuel consumption in transport service bus fleets forms only a minor end user of energy, accounting for 0.7% of on-road use of fuel, of which 0.2% is petrol and 0.5% diesel. A further 0.7% is contributed by non-transport service buses.

2.6 Taxis and Rental Cars

Taxis account for a relatively small proportion of the vehicle fleet. Numbers have remained steady at about 3,000 or 0.2% of the population. However taxi utilisation is high and the majority are now powered by CNG or LPG where these fuels are available.

Rental vehicle numbers are increasing and now stand at some 7000 vehicles. Their utilisation is higher than for the car fleet as a whole. Most are petrol powered.

Taxi and rental vehicles account for 0.7% and 1.1% of on-road transport fuel use respectively.

2.7 Two Wheel Vehicles

Motorcycle numbers have increased considerably in the past ten years both for the on-road machines and, as far as

statistics show, farm bikes have enjoyed a similar increase in popularity.

There is relatively little data on utilisation but what there is indicates a much lower annual utilisation than four wheel vehicles.

Overall, fuel used by two wheelers is estimated at some 1.3% of on-road transport fuel. A similar magnitude to that used by buses or by rental vehicles.

2.8 Other Vehicles

A number of miscellaneous on-road vehicles such as mobile cranes, fertiliser speaders and other specialised vehicles make up the remaining on-road fuel use. Their combination is estimated to be 5.0% of on-road transport fuel of which 0.8% is petrol and 4.2% diesel.

TABLE 2.1
ASSIGNMENT OF PETROL TO ON ROAD VEHICLES BY TYPE OF VEHICLE (Millions of Litres)

DESCRIPTION	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
ON-ROAD TRANSPORT	2119.2	2229.3	2185.7	2179.1	2131.8	2130.2	2129.1	2187.7	2164.3	2167.9	2149.1	2175.4
Cars:												
Taxis	6.2	9.4	13.3	17.3	20.1	22.3	24.8	28.9	29.2	29.5	29.7	29.6
Rental Cars	40.7	29.8	28.7	25.2	24.7	23.9	22.1	22.3	23.8	21.8	21.3	20.3
Business	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2
Household - farm	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4
Household - other	775.3	872.9	800.6	775.4	743.0	760.4	767.9	847.0	825.4	861.8	836.3	863.9
CARS	1411.8	1501.6	1432.2	1407.4	1377.4	1396.2	1404.4	1487.7	1467.9	1502.6	1476.9	1503.4
Light Commercials:												
Rental	6.3	4.6	4.4	3.9	3.8	3.7	3.4	3.4	3.7	3.4	3.3	3.1
Licensed Transport	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Ancillary Business	386.0	405.4	405.6	399.9	368.0	346.3	341.0	309.2	295.9	249.0	236.3	231.3
Farms	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
Households	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
LIGHT COMMERCIALS	501.8	519.5	519.5	513.3	481.3	459.5	453.9	422.1	409.1	361.9	349.1	343.9
Heavy Commercials:												
Licensed Transport	29.0	29.0	35.1	40.9	44.8	45.7	45.7	47.4	49.6	53.8	60.1	61.5
Ancillary Business	77.0	77.0	93.1	108.6	118.9	121.5	121.5	126.0	131.8	142.7	159.5	163.3
Public Bodies	33.0	33.0	39.9	46.5	50.9	52.1	52.1	54.0	56.5	61.2	68.3	70.0
HEAVY COMMERCIALS	119.5	119.5	144.5	168.5	184.5	188.5	188.5	195.5	204.5	221.5	247.5	253.5
Buses:												
Transport	32.5	34.3	34.6	34.8	35.1	35.3	35.5	35.7	36.0	36.2	36.5	36.8
Ancillary	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
BUSES	52.0	53.8	54.1	54.3	54.6	54.8	55.0	55.2	55.5	55.7	56.0	56.3
MOTOR/POWER CYCLES	28.3	29.1	29.6	29.7	28.1	25.3	21.5	21.3	21.4	20.3	13.8	12.5
MISCELLANEOUS	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
TOTAL ON-ROAD	2119.2	2229.3	2185.7	2179.1	2131.8	2130.2	2129.1	2187.7	2164.3	2167.9	2149.1	2175.4

TABLE 2.1 (Contd)
ASSESSMENT OF DIESEL USE IN TRANSPORT FROM VEHICLE FLEET AND UTILISATION DATA

VEHICLE TYPE	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Light Goods Vehicles	9.6	9.5	9.2	8.9	8.2	7.8	7.6	7.1	6.9	6.1	5.8	5.8
Heavy Goods Vehicles	506.0	475.0	464.0	446.0	411.0	393.0	368.0	359.0	351.0	318.0	296.0	254.0
Buses	36.1	29.1	28.0	28.3	28.5	27.5	26.5	24.7	22.8	21.1	19.3	17.8
Miscellaneous	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1
ON-ROAD VEHICLES	656.8	618.7	606.3	588.3	552.8	533.4	507.2	495.9	485.8	450.3	426.2	382.7
Tractors	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Trucks	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Forklifts	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Machines	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
OFF-ROAD VEHICLES	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8
ON- & OFF-ROAD	759.6	721.5	709.1	691.1	655.6	636.2	610.0	598.7	588.6	553.1	529.0	485.5

CNG AND LPG FUEL USE IN VEHICLES - TIME SERIES

Year	PJ Gas Fuels			Amount of Petrol Substituted (PJ)			
	CNG	LPG	Total	CNG	LPG	PJ	Litres (10^6)
1985							
1984	4.04	1.39	5.43	4.36	1.46	5.82	180
1983	2.57	0.72	3.29	2.78	0.76	3.53	109
1982	1.17	0.56	1.73	1.26	0.59	1.85	57
1981	0.74	0.49	1.23	0.80	0.51	1.31	41
1980	0.20	0.37	0.57	0.22	0.39	0.60	19
1979	0.05	0.29	0.34	0.05	0.30	0.36	11
1978		0.22	0.22		0.23	0.23	7
1977		0.17	0.17		0.18	0.18	6
1976		0.09	0.09		0.09	0.09	3

CNG AND LPG USE IN VEHICLES, 1984

Description	CNG	LPG	Total
Number of road vehicles.....	70,000	12,000	82,000
Average annual kilometres.....	23,800	30,000	24,700
% running on gas fuel.....	93.5	100	
Total travel, million kilometres.	1,666	360	2,026
Travel on gas fuel.....	1,558	360	1,918
Fuel use:			
m3 or litres/100km.....	9.38	15.63	
MJ/100km.....	375	386	
m3 or litres (10^6).....	146	56	
PJ.....	5.84	1.39	7.23
Equiv. litres petrol (10^6)	195	45	240

TABLE 2.2 - FUEL USE IN CARS

VEHICLES (000s)

	CARS			CARS - BUSINESS/PRIVATE BREAKDOWN								
	ENGINE SIZE BREAKDOWN			BUSINESS				PRIVATE				TOTAL
MODEL YEAR	<1350	1350-2000	>2000	<1350	1350-2000	>2000	TOTAL BUSINESS	<1350	1350-2000	>2000	TOTAL PRIVATE	CARS
1985	24599	53918	5771	11510	25229	2700	39440	13088	28688	3071	44848	84288
1984	28025	63356	6663	11273	25486	2680	39440	16751	37870	3983	58604	98044
1983	23415	46998	4925	12258	24604	2578	39440	11157	22395	2347	35899	75339
1982	28587	50477	5529	9996	17651	1933	29580	18591	32827	3596	55013	84593
1981	33826	47481	8682	7413	10405	1903	19720	26413	37076	6779	70268	89988
1980	31446	35877	9390	4042	4611	1207	9860	27404	31265	8183	66852	76712
1979	26105	30956	11730	1497	1775	673	3944	24608	29181	11057	64847	68791
1978	24001	28461	10784	1497	1775	673	3944	22505	26686	10112	59303	63247
1977	21359	25327	9597	1497	1775	673	3944	19862	23553	8924	52339	56283
1976	25661	30429	11530	1497	1775	673	3944	24164	28654	10858	63676	67620
1975	28921	34295	12995	374	444	168	986	28547	33851	12827	75225	76211
1974	31754	37654	14268	374	444	168	986	31380	37210	14100	82689	83675
1973	33548	39782	15074	374	444	168	986	33174	39338	14906	87417	88403
1972	29203	34629	13121	75	89	34	197	29128	34540	13088	76756	76953
1971	20260	24025	9103	75	89	34	197	20186	23936	9070	53192	53389
1970	20082	23813	9023	75	89	34	197	20007	23724	8990	52721	52918
1969	14647	17368	6581	37	44	17	99	14609	17324	6564	38497	38596
1968	11512	13651	5172	37	44	17	99	11474	13606	5156	30236	30335
1967	11870	14075	5333	37	44	17	99	11832	14031	5316	31179	31278
1966	11360	13471	5105	2	2	1	5	11359	13469	5104	29931	29936
older	53099	62966	23859	2	2	1	5	53097	62963	23858	139919	139924
TOTAL	533278	729009	204236	63942	116820	16349	197200	469336	612189	187887	1269411	1466523

TABLE 2.2 (Contd) - ANNUAL TRAVEL PER VEHICLE (KMS PER YEAR)

	BUSINESS CARS				PRIVATE CARS				ALL CARS			
MODEL YEAR	<1350	1350-2000	>2000	TOTAL	<1350	1350-2000	>2000	TOTAL	<1350	1350-2000	>2000	TOTAL
1985	20000	24000	22500	22575	8186	11111	18874	10925	13714	17142	20571	16376
1984	20000	24000	22500	22575	9483	12527	19272	12236	13714	17142	20571	16395
1983	20000	24000	22500	22575	5114	7492	15912	7395	12907	16134	19361	15342
1982	19167	23000	21563	21634	9541	12442	18177	11824	12907	16134	19361	15254
1981	18333	22000	20625	20694	10351	13196	17456	12480	12100	15125	18151	14280
1980	17500	21000	19688	19753	10378	13102	16535	12354	11294	14117	16941	13305
1979	16667	20000	18750	18813	10111	12690	15547	12181	10487	13109	15731	12561
1978	16667	20000	18750	18813	9216	11575	14239	11115	9680	12100	14520	11595
1977	16667	20000	18750	18813	8720	10963	13551	10531	9277	11596	13915	11112
1976	16667	20000	18750	18813	8391	10540	12974	10122	8874	11092	13310	10628
1975	16667	20000	18750	18813	8363	10464	12626	10032	8470	10588	12705	10145
1974	16667	20000	18750	18813	7964	9965	12021	9553	8067	10084	12100	9662
1973	16667	20000	18750	18813	7970	9972	12025	9559	8067	10084	12100	9662
1972	16667	20000	18750	18813	8045	10058	12083	9639	8067	10084	12100	9662
1971	16667	20000	18750	18813	7630	9541	11468	9143	7664	9579	11495	9179
1970	16667	20000	18750	18813	7225	9034	10861	8658	7260	9075	10890	8696
1969	16667	20000	18750	18813	6832	8542	10264	8186	6857	8571	10285	8213
1968	16667	20000	18750	18813	6420	8028	9651	7694	6454	8067	9680	7730
1967	16667	20000	18750	18813	6017	7523	9045	7210	6050	7563	9075	7247
1966	16667	20000	18750	18813	5645	7056	8469	6762	5647	7059	8470	6764
older	16667	20000	18750	18813	5646	7058	8470	6763	5647	7059	8470	6764
MEAN	19130	23250	21196	21720	8065	10319	12506	9811	9391	12391	13202	11463

TABLE 2.2 (Contd) - TOTAL TRAVEL (MILLIONS OF KMS PER YEAR)

	BUSINESS CARS				PRIVATE CARS				ALL CARS			
MODEL YEAR	<1350	1350-2000	>2000	TOTAL	<1350	1350-2000	>2000	TOTAL	<1350	1350-2000	>2000	TOTAL CARS
1985	230	606	61	890	107	319	58	490	337	924	119	1380
1984	225	612	60	890	159	474	77	717	384	1086	137	1607
1983	245	590	58	890	57	168	37	265	302	758	95	1156
1982	192	406	42	640	177	408	65	650	369	814	107	1290
1981	136	229	39	408	273	489	118	877	409	718	158	1285
1980	71	97	24	195	284	410	135	826	355	506	159	1021
1979	25	35	13	74	249	370	172	790	274	406	185	864
1978	25	35	13	74	207	309	144	659	232	344	157	733
1977	25	35	13	74	173	258	121	551	198	294	134	625
1976	25	35	13	74	203	302	141	645	228	338	153	719
1975	6	9	3	19	239	354	162	755	245	363	165	773
1974	6	9	3	19	250	371	169	790	256	380	173	808
1973	6	9	3	19	264	392	179	836	271	401	182	854
1972	1	2	1	4	234	347	158	740	236	349	159	744
1971	1	2	1	4	154	228	104	486	155	230	105	490
1970	1	2	1	4	145	214	98	456	146	216	98	460
1969	1	1	0	2	100	148	67	315	100	149	68	317
1968	1	1	0	2	74	109	50	233	74	110	50	234
1967	1	1	0	2	71	106	48	225	72	106	48	227
1966	0	0	0	0	64	95	43	202	64	95	43	202
older	0	0	0	0	300	444	202	946	300	444	202	946
TOTAL	1223	2716	347	4283	3785	6317	2350	12455	5008	9033	2696	16738

TABLE 2.2 (Contd) - FUEL CONSUMPTION (LITRES/100 KM)

	BUSINESS CARS				PRIVATE CARS			
MODEL YEAR	<1350	1350-2000	>2000	TOTAL	<1350	1350-2000	>2000	TOTAL
1985	7.43	9.46	0.00	8.35	7.29	9.27	0.00	7.61
1984	7.50	9.56	0.00	8.46	7.38	9.39	0.00	7.84
1983	7.58	9.65	0.00	8.49	7.40	9.41	0.00	7.50
1982	7.64	9.73	0.00	8.46	7.53	9.58	0.00	8.06
1981	7.71	9.81	0.00	8.07	7.61	9.68	0.00	7.77
1980	7.77	9.89	0.00	7.74	7.69	9.77	0.00	7.49
1979	7.84	9.98	0.00	7.41	7.76	9.86	0.00	7.07
1978	7.91	10.07	0.00	7.48	7.82	9.94	0.00	7.12
1977	7.98	10.17	0.00	7.55	7.89	10.02	0.00	7.17
1976	8.06	10.26	0.00	7.62	7.96	10.11	0.00	7.24
1975	8.13	10.36	0.00	7.69	8.03	10.20	0.00	7.33
1974	8.21	10.45	0.00	7.76	8.10	10.29	0.00	7.39
1973	8.28	10.55	0.00	7.83	8.17	10.38	0.00	7.46
1972	8.28	10.55	0.00	7.83	8.17	10.39	0.00	7.47
1971	8.28	10.55	0.00	7.83	8.17	10.38	0.00	7.46
1970	8.28	10.55	0.00	7.83	8.16	10.37	0.00	7.45
1969	8.28	10.55	0.00	7.83	8.16	10.36	0.00	7.45
1968	8.28	10.55	0.00	7.83	8.15	10.35	0.00	7.44
1967	8.28	10.55	0.00	7.83	8.15	10.35	0.00	7.44
1966	8.28	10.55	0.00	7.83	8.14	10.34	0.00	7.44
older	8.28	10.55	0.00	8.18	8.14	10.34	0.00	8.16
MEAN	7.61	9.66	0.00	8.30	7.91	9.83	0.74	7.52

TABLE 2.2 (Contd) ESTIMATED FUEL USE (MILLIONS OF LITRES)

MODEL YEAR	BUSINESS CARS <1350 CC	BUSINESS CARS 1350-2000 CC	BUSINESS CARS >2000 CC	BUSINESS CARS TOTAL	PRIVATE CARS <1350 CC	PRIVATE CARS 1350-2000 CC	PRIVATE CARS >2000 CC	PRIVATE CARS TOTAL	TOTAL CARS
1985	17.09	57.29	0.00	74.38	7.48	28.42	0.00	35.91	110.29
1984	16.91	58.46	0.00	75.37	11.35	43.20	0.00	54.55	129.92
1983	18.57	57.00	0.00	75.57	3.94	14.87	0.00	18.80	94.37
1982	14.64	39.51	0.00	54.15	13.00	38.13	0.00	51.13	105.29
1981	10.47	22.47	0.00	32.94	20.43	46.53	0.00	66.96	99.90
1980	5.50	9.58	0.00	15.08	21.54	39.47	0.00	61.02	76.10
1979	1.95	3.54	0.00	5.50	19.07	36.10	0.00	55.17	60.66
1978	1.97	3.57	0.00	5.55	16.05	30.38	0.00	46.42	51.97
1977	1.99	3.61	0.00	5.60	13.54	25.65	0.00	39.18	44.78
1976	2.01	3.64	0.00	5.65	16.03	30.33	0.00	46.36	52.01
1975	0.51	0.92	0.00	1.43	19.10	36.02	0.00	55.12	56.55
1974	0.51	0.93	0.00	1.44	20.24	38.15	0.00	58.39	59.83
1973	0.52	0.94	0.00	1.45	21.70	40.90	0.00	62.60	64.05
1972	0.10	0.19	0.00	0.29	19.33	36.41	0.00	55.74	56.03
1971	0.10	0.19	0.00	0.29	12.78	24.07	0.00	36.84	37.14
1970	0.10	0.19	0.00	0.29	12.07	22.74	0.00	34.81	35.10
1969	0.05	0.09	0.00	0.15	8.40	15.81	0.00	24.21	24.36
1968	0.05	0.09	0.00	0.15	6.25	11.77	0.00	18.02	18.17
1967	0.05	0.09	0.00	0.15	6.09	11.47	0.00	17.56	17.71
1966	0.00	0.00	0.00	0.01	5.53	10.41	0.00	15.94	15.95
older	0.00	0.00	0.00	0.01	25.87	38.42	17.51	81.80	81.81
TOTAL	93.12	262.30	0.00	355.42	299.79	619.25	17.51	936.55	1291.97
PER VEH.	1456	2245	0	1802	624	991	91	722	864

TABLE 2.3
FUEL USE BY LIGHT COMMERCIAL VEHICLES (1984)

	Petrol Litres (10^6)	Diesel Litres (10^6)	LPG/CNG PJ	Total
Ancillary Transport	428.7	6.0	1.43	436.1
Government Administration	12.5	0.2	0.11	12.7
Licensed Transport	55.9	2.3	0.13	58.3
Household	22.4	1.1	0.00	23.5

LIGHT GOODS VEHICLES - FUEL USE

Year	Petrol Litres (10^6)	Diesel Litres (10^6)	LPG PJ	CNG PJ	Total PJ
1985	501.8	9.6	0.6	1.9	19.1
1984	519.5	9.5	0.3	1.4	18.8
1983	519.5	9.2	0.1	0.9	18.2
1982	513.3	8.9	0.1	0.5	17.5
1981	481.3	8.2	0.1	0.2	16.2
1980	459.5	7.8	0.1	0.1	15.3
1979	453.9	7.6	0.1	0.0	15.1
1978	422.1	7.1	0.0	0.0	14.0
1977	409.1	6.9	0.0	0.0	13.5
1976	361.9	6.1	0.0	0.0	12.0
1975	349.1	5.8	0.0	0.0	11.5
1974	343.9	5.8	0.0	0.0	11.3
1973	326.4	5.5	0.0	0.0	10.8
1972	312.8	5.2	0.0	0.0	10.3
1971	294.4	4.9	0.0	0.0	9.7
1970	276.0	4.6	0.0	0.0	9.1

TABLE 2.4 HEAVY COMMERCIAL VEHICLES - NUMBERS, 1984 (000s)

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	0.50	0.10	0.60	3.00	0.10	3.10	1.40		1.40	0.40	0.10	0.50	5.30	0.30	5.60
3.5 - 5.0	0.50	0.80	1.30	0.10	2.00	2.10	0.90	0.10	1.00	0.30	0.50	0.80	1.80	3.40	5.20
5.0 - 10.0	1.60	2.50	4.10	10.00	0.10	10.10	2.40	0.80	3.20	0.90	0.60	1.50	14.90	4.00	18.90
10.0 - 15.0	1.20	5.60	6.80	2.60	9.70	12.30	1.10	0.60	1.70	0.70	0.90	1.60	5.60	16.80	22.40
15.0 - 20.0	0.30	5.00	5.30	0.50	1.90	2.40	0.10	0.40	0.50		0.30	0.30	0.90	7.60	8.50
20.0 - 30.0	0.10	8.30	8.40	0.10	2.70	2.80	0.10	0.20	0.30		0.20	0.20	0.30	11.40	11.70
over 30.0		0.70	0.70		0.30	0.30								1.00	1.00
POWERED....	4.20	23.00	27.20	16.30	16.80	33.10	6.00	2.10	8.10	2.30	2.60	4.90	28.80	44.50	73.30
Trailers:															
2.0 - 3.5	0.15	0.05	0.20	0.10		0.10	0.20		0.20	0.15	0.05	0.20	0.60	0.10	0.70
3.5 - 5.0	0.05	0.05	0.10		0.10	0.10	0.10		0.10	0.05	0.05	0.10	0.20	0.20	0.40
5.0 - 10.0	0.10	0.20	0.30	0.40		0.40	0.10		0.10	0.05	0.05	0.10	0.65	0.25	0.90
10.0 - 15.0	0.10	0.60	0.70	0.20	0.70	0.90							0.30	1.30	1.60
15.0 - 20.0	0.10	1.80	1.90	0.15	0.55	0.70							0.25	2.35	2.60
20.0 - 30.0	0.05	3.35	3.40	0.05	1.05	1.10							0.10	4.40	4.50
over 30.0		1.10	1.10		0.30	0.30								1.40	1.40
TRAILERS...	0.55	7.15	7.70	0.90	2.70	3.6	0.40		0.40	0.25	0.15	0.40	2.10	10.00	12.10
TOTAL.....	4.75	30.15	34.90	17.20	19.50	36.70	6.40	2.10	8.50	2.55	2.75	5.30	30.90	54.50	85.40

HEAVY COMMERCIAL VEHICLES - ANNUAL TRAVEL (1984) - kms(000s)/vehicle

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	23.1	36.0	25.3	12.6	19.9	12.8	12.1	19.1	12.1	14.3	22.5	15.9	13.6	26.1	14.3
3.5 - 5.0	12.0	19.0	16.3	9.9	15.6	15.3	9.0	14.3	9.5	11.8	16.1	14.5	10.4	16.4	14.3
5.0 - 10.0	14.9	23.5	20.1	14.0	22.2	14.1	8.6	13.6	9.9	9.8	12.0	10.7	13.0	19.8	14.4
10.0 - 15.0	15.1	23.9	22.3	8.8	13.9	12.8	12.0	18.9	14.4	16.6	22.0	19.6	11.8	17.8	16.3
15.0 - 20.0	20.0	31.6	30.9	10.3	16.4	15.1	7.4	11.6	10.8	23.3	36.8	36.8	13.2	27.0	25.5
20.0 - 30.0	31.0	49.1	48.9	9.7	15.3	15.1	12.0	18.9	16.6	21.0	33.2	33.2	17.6	40.3	39.7
over 30.0	26.3	41.6	41.6	20.4	32.3	32.3								38.8	38.8
POWERED....	16.3	35.0	32.2	12.7	15.0	13.9	10.1	15.3	11.5	12.9	21.1	17.3	12.7	25.7	20.6
Trailers:															
2.0 - 3.5	13.5	13.5	13.5	7.5	7.5	7.5	7.5		7.5	9.5	9.5	9.5	9.5	11.5	9.8
3.5 - 5.0	12.0	12.0	12.0	11.0	11.0	11.0	6.7		6.7	10.1	10.1	10.1	8.9	11.0	10.0
5.0 - 10.0	18.5	33.5	28.5	17.0	20.0	17.0	14.0		14.0	10.0	19.0	14.5	16.2	30.6	20.2
10.0 - 15.0	19.5	33.5	31.5	12.0	20.0	18.2							14.5	26.2	24.0
15.0 - 20.0	28.0	35.0	34.6	14.0	19.0	17.9							19.6	31.3	30.1
20.0 - 30.0	36.0	36.0	36.0	13.0	18.0	17.8							24.5	31.7	31.5
over 30.0		39.0	39.0		19.0	19.0								34.7	34.7
TRAILERS...	20.0	35.6	34.5	14.1	18.6	17.5	8.9		8.9	9.7	12.9	10.9	14.2	30.7	27.8
TOTAL.....	16.8	35.2	32.7	12.8	15.5	14.3	10.1	15.3	11.3	12.6	20.7	16.8	12.8	26.6	21.6

TABLE 2.4 HEAVY COMMERCIAL VEHICLES - TRAVEL VOLUME (1984) - million vehicle-kms

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	11.6	3.6	15.2	37.8	2.0	39.8	16.9		16.9	5.7	2.3	8.0	72.0	7.8	79.9
3.5 - 5.0	6.0	15.2	21.2	1.0	31.2	32.2	8.1	1.4	9.5	3.5	8.1	11.6	18.6	55.9	74.5
5.0 - 10.0	23.8	58.8	82.6	140.0	2.2	142.2	20.6	10.9	31.5	8.8	7.2	16.0	193.3	79.1	272.4
10.0 - 15.0	18.1	133.8	152.0	22.9	134.8	157.7	13.2	11.3	24.5	11.6	19.8	31.4	65.8	299.8	365.6
15.0 - 20.0	6.0	158.0	164.0	5.2	31.2	36.3	0.7	4.6	5.4		11.0	11.0	11.9	204.8	216.7
20.0 - 30.0	3.1	407.5	410.6	1.0	41.3	42.3	1.2	3.8	5.0		6.6	6.6	5.3	459.3	464.5
over 30.0		29.1	29.1		9.7	9.7								38.8	38.8
POWERED....	68.6	806.0	874.7	207.8	252.4	460.2	60.8	32.1	92.9	29.7	55.0	84.7	366.9	1145.5	1512.4
Trailers:															
2.0 - 3.5	2.0	0.7	2.7	0.8		0.8	1.5		1.5	1.4	0.5	1.9	5.7	1.2	6.9
3.5 - 5.0	0.6	0.6	1.2		1.1	1.1	0.7		0.7	0.5	0.5	1.0	1.8	2.2	4.0
5.0 - 10.0	1.9	6.7	8.6	6.8		6.8	1.4		1.4	0.5	1.0	1.5	10.6	7.7	18.2
10.0 - 15.0	2.0	20.1	22.0	2.4	14.0	16.4							4.4	34.1	38.5
15.0 - 20.0	2.8	63.0	65.8	2.1	10.5	12.6							4.9	73.5	78.4
20.0 - 30.0	1.8	120.6	122.4	0.7	18.9	19.6							2.5	139.5	142.0
over 30.0		42.9	42.9		5.7	5.7								48.6	48.6
TRAILERS...	11.0	254.6	265.6	12.7	50.2	62.9	3.6		3.6	2.4	1.9	4.4	29.7	306.7	336.4
TOTAL.....	79.6	1060.6	1140.3	220.5	302.6	523.0	64.4	32.1	96.5	32.1	56.9	89.0	396.6	1452.1	1848.8

HEAVY COMMERCIAL VEHICLES - FUEL CONSUMPTION (1984) - litres/100km

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	24	16	22	24	16	24	24	16	24	24	16	22	24	16	23
3.5 - 5.0	30	20	23	30	20	20	30	20	28	30	20	23	30	20	23
5.0 - 10.0	38	25	29	38	25	37	38	25	33	38	25	32	37	25	34
10.0 - 15.0	45	30	32	44	29	31	44	29	37	44	29	34	44	29	32
15.0 - 20.0	60	40	41	57	38	41	57	38	41	57	38	38	59	40	41
20.0 - 30.0	74	49	49	69	46	47	69	46	52	69	46	46	72	49	49
over 30.0		63	63		45	60		60			60			59	59
POWERED....	40	40	40	36	31	33	35	31	33	36	30	33	37	37	37
Trailers:															
2.0 - 3.5	3	2	3	3	2	3	3	2	3	3	2	3	3	2	3
3.5 - 5.0	4	3	4	4	3	3	4	3	4	4	3	4	4	3	3
5.0 - 10.0	11	8	9	11	8	11	11	8	11	11	8	9	11	8	10
10.0 - 15.0	16	12	12	16	12	13	16	12		16	12		16	12	12
15.0 - 20.0	20	16	16	20	16	17	20	16		20	16		20	16	16
20.0 - 30.0	32	24	24	32	24	24	32	24		32	24		32	24	24
over 30.0		30	30		30	30		30			30			30	30
TRAILERS...	16	16	16	14	16	15	6		6	5	5	5	13	16	16
TOTAL.....	37	34	34	35	28	31	33	31	32	34	30	31	35	33	33

TABLE 2.4 HEAVY COMMERCIAL VEHICLES - FUEL USE (1984) - million litres

GROSS WEIGHT	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
tonnes	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	2.8	0.6	3.3	9.1	0.3	9.4	4.1		4.1	1.4	0.4	1.7	17.3	1.3	18.5
3.5 - 5.0	1.8	3.0	4.8	0.3	6.2	6.5	2.4	0.3	2.7	1.1	1.6	2.7	5.6	11.2	16.8
5.0 - 10.0	8.9	14.7	23.6	52.5	0.6	53.1	7.7	2.7	10.5	3.3	1.8	5.1	72.5	19.8	92.3
10.0 - 15.0	8.2	40.2	48.3	10.0	39.1	49.1	5.7	3.3	9.0	5.1	5.7	10.8	28.9	88.3	117.2
15.0 - 20.0	3.6	63.2	66.8	2.9	11.8	14.8	0.4	1.8	2.2		4.2	4.2	7.0	81.0	88.0
20.0 - 30.0	2.3	199.7	202.0	0.7	19.0	19.7	0.8	1.7	2.6		3.1	3.1	3.8	223.5	227.3
over 30.0		18.3	18.3		4.4	4.4								22.7	22.7
POWERED....	28	321	349	75	77	152	21	10	31	11	17	28	135	425	560
Trailers:															
2.0 - 3.5	0.1	0.0	0.1	0.0		0.0	0.0		0.0	0.0	0.0	0.1	0.2	0.0	0.2
3.5 - 5.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.1	0.1
5.0 - 10.0	0.2	0.5	0.7	0.7		0.7	0.2		0.2	0.1	0.1	0.1	1.2	0.6	1.8
10.0 - 15.0	0.3	2.4	2.7	0.4	1.7	2.1							0.7	4.1	4.8
15.0 - 20.0	0.6	10.1	10.6	0.4	1.7	2.1							1.0	11.8	12.7
20.0 - 30.0	0.6	28.9	29.5	0.2	4.5	4.7							0.8	33.5	34.3
over 30.0		12.9	12.9		1.7	1.7								14.6	14.6
TRAILERS...	2	42	44	2	8	10	0		0	0	0	0	4	50	54
TOTAL.....	29	363	393	77	85	162	21	10	31	11	17	28	139	475	614

HEAVY VEHICLE FUEL USE - TIME SERIES, Litres

Year	Petrol	Diesel	Total
1985	139	506	646
1984	139	475	614
1983	164	464	628
1982	188	446	634
1981	204	411	615
1980	208	393	601
1979	208	368	576
1978	215	359	574
1977	224	351	575
1976	241	318	558
1975	267	296	563
1974	273	254	527
1973	299	233	532
1972	329	212	541
1971	341	182	523
1970	352	154	506

TABLE 2.5
FUEL USE IN BUSES

BUSES - NUMBERS BY OPERATOR AND FUEL TYPE (1984)

OPERATOR	PETROL	DIESEL	CNG	ELECTRIC	TOTAL
Local Authority	100	1,050	30	120	1,300
Private:					
- urban/suburban	400	100			500
- route	350	100			450
- charter/tour	150	350			500
- school	650	450			1,100
Private	1,550	1,000			2,550
N.Z.R. Road Services					
- urban/suburban	280	50			330
- route	100	330			430
N.Z.R.	380	380			760
Education Dept	700				700
Transport services	2730	2430	30	120	5310
Ancillary vehicles	4880	100	290		5270
Total	7610	2530	320	120	10580

BUSES - ANNUAL TRAVEL BY OPERATOR AND FUEL TYPE (1984) - kms/vehicle

OPERATOR	PETROL	DIESEL	CNG	ELECTRIC	ALL
Local Authority	32,000	37,700	28,000	22,000	35,588
Private:					
- urban/suburban	40,300	40,300			40,300
- route	48,000	52,000			48,889
- charter/tour	41,200	41,200			41,200
- school	18,500	22,500			20,136
Private	32,984	33,775			33,294
N.Z.R. Road Services					
- urban/suburban	51,900	51,900			51,900
- route	56,500	56,500			56,500
N.Z.R.	53,111	55,895			54,503
Education Dept	14,000				14,000
Transport services	30,882	38,930	28,000	22,000	34,348
Ancillary vehicles	20,000	20,000	20,000		
All	23,904	38,182	20,750	22,000	27,201

TABLE 2.5 (Contd)
FUEL USE IN BUSES

BUSES - TRAVEL VOLUME BY OPERATOR AND FUEL TYPE (1984), Bus-kms (10^6)

OPERATOR	PETROL	DIESEL	CNG	ELECTRIC	ALL
Local Authority	3.2	39.6	0.8	2.6	46.3
Private:					
- urban/suburban	16.1	4.0			20.2
- route	16.8	5.2			22.0
- charter/tour	6.2	14.4			20.6
- school	12.0	10.1			22.2
Private	51.1	33.8			84.9
N.Z.R. Road Services					
- urban/suburban	14.5	2.6			17.1
- route	5.7	18.6			24.3
N.Z.R.	20.2	21.2			41.4
Education Dept	9.8				9.8
Transport services	84.3	94.6	0.8	2.6	182.4
Ancillary vehicles	97.6	2.0	5.8		105.4
All	181.9	96.6	6.6	2.6	287.8

BUSES - FUEL CONSUMPTION BY OPERATOR AND FUEL TYPE (1984)

OPERATOR	PETROL 1/100km	DIESEL 1/100km	CNG GJ/100km	ELECTRIC GJ/100km
Local Authority	46	37	1.5	1.0
Private:				
- urban/suburban	46	35		
- route	38			
- charter/tour	38	28		
- school	29	30		
Private				
N.Z.R. Road Services				
- urban/suburban	55			
- route	42	32		
N.Z.R.				
Education Dept	29			
Transport services				
Ancillary vehicles	20	15		
All				

TABLE 2.5 (Contd)
FUEL USE IN BUSES

BUSES - FUEL USE BY OPERATOR AND FUEL TYPE (1984)

OPERATOR	PETROL million litres	DIESEL million litres	CNG GJ	ELECTRIC GJ	TOTAL PJ
Local Authority	1.5	14.6	0.01	0.03	0.58
Private:					
- urban/suburban	7.4	1.4			0.29
- route	6.4				0.21
- charter/tour	2.3	4.0			0.22
- school	3.5	3.0			0.22
Private	19.6	8.5			0.94
N.Z.R. Road Services					
- urban/suburban	8.0				0.26
- route	2.4	6.0			0.29
N.Z.R.	10.4	6.0			0.55
Education Dept	2.8				0.09
Transport services	34.3	29.1	0.01	0.03	2.16
Ancillary vehicles	19.5	0.3			0.64
All - units as above	53.8	29.4	0.01	0.03	2.80
- PJ	1.74	1.06	0.00	0.00	2.80

TABLE 2.6
TAXIS AND RENTAL VEHICLES
ESTIMATED FUEL CONSUMPTION, 1981

Vehicle Type and Operator	Number	Fuel Type	Annual Kms	Litres (cu m) /100 kms	Litres (cu m) (10^6)	Litres Petrol Substituted (10^6)
TAXI OPERATORS:						
Cars ...	2,000	Petrol	58,630	17.1	20.1	20.1
	60	Diesel	58,630	12.8	0.5	0.5
	440	LPG	58,630	21.4	5.5	4.4
	440	CNG	58,630	12.8	3.3	4.4
Total.....	2,940					29.3
RENTAL OPERATORS:						
Cars.....	7,870	Petrol	26,130	12.0	24.7	24.7
Light CVs....	1,180	Petrol	26,130	12.0	3.7	3.7
	30	Diesel	26,130	12.0	0.1	0.1
Heavy CVs....	210	Petrol	26,130	20.0	1.1	1.1
	20	Diesel	26,130	15.0	0.1	0.1
Buses.....	20	Petrol	26,130	15.0	0.1	0.1
Motorcycles..	70	Petrol	26,130	5.0	0.1	0.1
Caravans.....	20	Petrol	26,130	15.0	0.1	0.1
Support Vehs.	110	Petrol	26,130	12.0	0.3	0.3
	30	Diesel	26,130	15.0	0.1	0.2
Total.....	9,560				30.4	30.5
Total	11,480	Petrol			19.8	50.1
	140	Diesel			0.7	0.8
	440	LPG			5.5	4.4
	440	CNG			3.3	4.4
	12,500					59.8

ESTIMATED FUEL CONSUMPTION - TIME SERIES (10^6 Litres or Cu m)

Year	Taxis				Rental Vehicles				
	Petrol	Diesel	CNG (cu m)	LPG	Cars	Light CV	Heavy CV	Other	All
1985	6.2	0.5	12.0	7.2	40.7	6.3	1.9	1.2	50.1
1984	9.4	20.1	37.9	6.2	29.8	4.6	1.4	0.9	36.6
1983	13.3	20.1	32.0	5.3	28.7	4.4	1.4	0.8	35.3
1982	17.3	20.1	26.0	4.3	25.2	3.9	1.2	0.7	31.0
1981	20.1	20.1	20.1	3.3	24.7	3.8	1.2	0.7	30.4
1980	22.3	20.1	13.9	2.3	23.9	3.7	1.1	0.7	29.5
1979	24.8	20.1	8.0	1.3	22.1	3.4	1.1	0.6	27.2
1978	28.9	20.1	0.0	0.0	22.3	3.4	1.1	0.6	27.4
1977	29.2	20.1	0.0	0.0	23.8	3.7	1.1	0.7	29.2
1976	29.5	20.1	0.0	0.0	21.8	3.4	1.0	0.6	26.9
1975	29.7	20.1	0.0	0.0	21.3	3.3	1.0	0.6	26.2
1974	29.6	20.1	0.0	0.0	20.3	3.1	1.0	0.6	25.0

TABLE 2.7
ESTIMATE OF FUEL USE BY TWO WHEEL VEHICLES, 1984

Vehicle	Number	Annual Kilometres	Litres/ 100 kms	Litres (10^6)
MOTORCYCLES:				
Non-farm:	141,200	4,000	5	28.2
Farm Bikes:				
on-road	38,000	400	5	0.8
off-road		2,200	7.5	6.3
	179,200	6,600		35.3
MOPEDS:	1,400	2,000	2	0.1
TOTAL	180,600			35.3

ESTIMATE OF FUEL USE BY TWO-WHEEL VEHICLES - TIME SERIES

Year	On-Road	Off-Road	Total
1985	28.3	8.5	36.8
1984	29.1	6.3	35.3
1983	29.6	8.0	37.6
1982	29.7	7.7	37.4
1981	28.1	7.4	35.6
1980	25.3	7.2	32.5
1979	21.5	6.8	28.3
1978	21.3	6.4	27.8
1977	21.4	6.0	27.5
1976	20.3	5.7	26.0
1975	13.8	5.3	19.0
1974	12.5	4.9	17.4
1973	9.8	4.5	14.3
1972	8.1	4.1	12.2
1971	6.6	3.7	10.3
1970	6.0	3.3	9.3

TABLE 2.8

ESTIMATED FUEL USE BY LICENSED NON-AGRICULTURAL MISCELLANEOUS VEHICLES

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)
ON-ROAD:								
Tractors	700	900	7.5	4.7	3,400	900	5	15.3
Hopper Spreaders	300	5000	20	0.3	200	5000	15	0.2
Fire Engines	800	5000	20	0.8	200	5000	15	0.2
Mobile Cranes	0				900	500	10	4.5
Mobile Machines	1,100	900	15	14.9	6,300	900	15	85.1
On-Road	2,900			20.7	11,000			105.1
OFF-ROAD:								
Tractors	1,100	900	7.5	7.4	3,700	900	5	16.7
Trucks	900	100	40	3.6	800	100	40	3.2
Fork Lifts	1,100	1000	4	4.4	700	1000	2.7	1.9
Mobile Machines	1,100	900	15	14.9	6,000	900	15	81.0
Off-Road	4,200			30.3	11,200			102.7
TOTAL	7,100			51.0	22,200			207.9

3.0 OTHER TRANSPORT AND AUTOMOTIVE USE

3.1 Off-Road Automotive Use

Off-road use of fuel in automotive engines was not included in NZERDC Report 27. However, it was appreciated that this sector was of some magnitude. Data which has become available since that time indicate that off-road use is in fact a major consumption sector, particularly for diesel fuel.

While most of this consumption is in farm vehicles, significant amounts are also attributable to forestry and construction, and a smaller amount to other industry and equipment used by territorial local authorities.

There are still some problems in fully reconciling the fuel supply figures with consumption sectors for diesel fuel. Overall fuel use off-road in tractors, trucks and other mobile machines is estimated to be 7.5% of on-road use, comprising 50% petrol and 50% diesel.

3.2 Rail Transport

Changes in rail transport in recent years include a gradual reduction in passenger volumes. Freight traffic remained level up to 1984 when, with deregulation there was a slight reduction in net freight tonnes although this was counteracted by an increase in average haul.

Changes in fuel use by rail transport since 1975 have therefore been relatively minor.

3.3 Aviation

Domestic aviation consumed an estimated 6.8 PJ of fuel in 1981 of which 76% was in transport services and the remainder in aerial work and defence.

Recent trends have been a modest increase in passenger numbers, passenger-kilometres and aircraft load factors on domestic services.

3.4 Coastal Shipping

Gross cargo tonnages for overseas shipping at N.Z. ports rose gradually to 1980 and subsequently declined to the level of the early 1970s. Coastal cargo has declined by some 20% since the mid 1970s. Numbers of vessel calls have declined in both the overseas and coastal trades while cargo tonnages transferred per vessel call have continued to increase.

No quantitative data on fuel utilisation have been obtained for this review of the shipping sector. Oil company delivery statistics to this sector are not precisely defined. However reports by the Shipping Corporation and NZ Railways (in respect of Cook Straight Ferries) indicate a considerable amount of re-equiping to burn heavier and cheaper fuel oils. Deliveries of fuel oils to internal transport (ie coastal shipping) indicate a reduction of about 50% since the mid-1970s but some of this is due to reclassification of use sectors.

TABLE 3.1 - OFF ROAD AUTOMOTIVE USE OF FUEL

ESTIMATED FUEL USE ON FARMS

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)
FARM-BASED VEHICLES:								
ON-FARM USE:								
Light CVs, 2WD.....	11,000	2,800	15.0	4.6	150	2,800	10.0	0.0
Light CVs, 4WD.....	13,000	2,275	22.0	6.5	150	2,275	15.0	0.1
Medium trucks.....	4,875	500	28.0	0.7	1,625	500	28.0	0.2
Heavy trucks.....	4,000	700	40.0	1.1	3,200	900	40.0	1.2
Farm bikes.....	38,000	2,250	7.5	6.4				0.0
Tractors, crawler.....	3,400	7,500		1				4
Tractors, wheeled.....	22,800	58,800		17				77
Harvesters.....	0	4,300		1				6
Sub-total.....	97,075	79,125		38.3	5,125	6,475		88.5
AGRICULTURAL CONTRACTORS, ON-FARM:								
Top Dressing (4).....				0.5				6.1
Farm Maintenance (5)...				4				6.5
Land Development (6)...				1				5
Sub-total.....				5.5				17.6

ESTIMATED FUEL USE BY LICENSED NON-AGRICULTURAL MISCELLANEOUS VEHICLES

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)
OFF-ROAD:								
Tractors	1,100	900	7.5	7.4	3,700	900	5	16.7
Trucks	900	100	40	3.6	800	100	40	3.2
Fork Lifts	1,100	1000	4	4.4	700	1000	2.7	1.9
Mobile Machines	1,100	900	15	14.9	6,000	900	15	81.0
Off-Road	4,200			30.3	11,200			102.7

TABLE 3.2
RAIL TRANSPORT STATISTICS

	Revenue Train-kms			Locomotive-kms (000s)					
Year	Passenger (000s)	Goods (000s)	Total (000s)	Diesel Locos	Diesel Railcars	Steam Locos	Elect Locos	Elect Units	Total
1985									
1984									
1983									
1982			18,844						28,765
1981			19,080						28,918
1980			18,782						29,259
1979	5,601	14,549	20,150	27,099	589	27	340	2,857	30,912
1978	5,235	14,839	20,074	27,331	1,135	29	333	2,766	31,594
1977	5,729	15,574	21,303	28,285	1,561	32	362	2,941	33,181
1976	6,791	15,262	22,053	27,314	2,725	27	372	3,076	33,514
1975				28,500	2,835	29	357	3,017	34,738
1974				29,281	2,851	34	351	3,057	35,574
1973				27,868	2,811	27	359	3,109	34,174
1972				26,740	3,146	101	368	3,083	33,438
1971				26,576	3,569	364	454	3,080	34,043
1970				25,559	3,612	457	533	3,099	33,260

RAIL TRANSPORT VOLUME: PASSENGER-KMS, TONNE-KMS

	Suburban Passenger Services				Long Distance Pass			Total Pass	Freight t-kms (10^6)
Year	Auck.	Well.	Dun.	Total	N.Isl	S.Isl	Total		
1985									
1984	27,528	214,862	0	242,390	142,713	73,057	215,770	458,160	3,165
1983	25,736	183,909	1,759	211,404	131,742	73,421	205,163	416,567	3,164
1982									3,252
1981	27,038	196,281	3,340	226,659	121,317	58,627	179,944	406,603	3,139
1980	27,725	214,538	4,983	247,246	128,198	63,978	192,176	439,422	3,226
1979	28,786	260,307	5,469	294,562	142,431	63,015	205,446	500,008	3,281
1978	26,284	240,244	5,569	272,097	140,854	68,654	209,508	481,605	3,402
1977		222,479		324,156	170,836	71,232	242,068	566,224	3,603
1976		209,768		367,798	233,461	92,668	326,129	693,927	3,650
1975								697,856	3,608

TABLE 3.2 (Contd)
RAIL TRANSPORT STATISTICS

FUEL USAGE

Year	Diesel Fuel: Locos Litres (000s)	Diesel Fuel: Railcars Litres (000s)	Diesel Fuel: Total Litres (000s)	Diesel Fuel: Total (PJ)	Electrical Energy: N.Isl Locos (GWh)	Electrical Energy: S.Isl Locos (GWh)	Electrical Energy: Elect Units (GWh)	Electrical Energy: Total (GWh)	Electrical Energy: Total (PJ)
1985									
1984			70,697	2.55				19.70	0.07
1983			70,675	2.54				17.29	0.06
1982			72,641	2.62				17.77	0.06
1981			73,075	2.63				18.25	0.07
1980			74,044	2.67				19.67	0.07
1979	77,915	826	78,741	2.83	0.93	2.14	20.23	23.30	0.08
1978	78,029	1,324	79,353	2.86	0.73	2.23	19.43	22.39	0.08
1977	82,652	1,708	84,360	3.04	1.21	2.38	20.74	24.33	0.09
1976	81,751	2,788	84,539	3.04	2.84	1.86	19.69	24.39	0.09
1975	80,896	2,731	83,627	3.01	0.73	1.80	14.58	17.11	0.06
1974	82,083	2,655	84,738	3.05	0.84	1.76	14.57	17.17	0.06
1973	76,018	2,355	78,373	2.82	0.87	1.51	15.29	17.68	0.06
1972	70,354	2,596	72,950	2.63	0.89	1.67	14.66	17.21	0.06
1971	69,877	2,855	72,732	2.62	1.02	2.42	15.24	18.68	0.07
1970	65,831	2,855	68,686	2.47	1.08	2.90	14.86	18.85	0.07

Notes: Fuel use figures for 1980 onwards estimated from travel volumes

Sources: N.Z.Railways Corporation Annual Reports, pers comms
Abstract of Statistics

TABLE 3.3
AIR TRANSPORT STATISTICS

	Domestic Scheduled Services						
Year	kms Flown (000s)	Passenger km (10^6)	Seat km (10^6)	Load Factor %	Tonne-km Performed	Tonne-km Available	Load Factor %
1985							
1984	34,837	1,397			152		
1983	28,003	1,168			128		
1982	26,362	1,085			121		
1981	25,608	1,134			128		
1980	26,105	1,172	1,752	66.9	143		
1979	27,282	1,232	1,735	71.0	138	212	65.1
1978	28,212	1,179	1,662	70.9	134	193	69.4
1977	26,526	1,123	1,633	68.8	129	197	65.5
1976	24,670	1,053	1,585	66.4	121	189	64.0
1975	25,171	1,034	1,481	69.8	116	178	65.2
1974	25,615	1,004	1,437	69.9	113	173	65.3
1973	22,985	892	1,187	75.1	99	141	70.2
1972	20,736	726	1,043	69.6	83	127	65.4
1971	19,675	672	1,008	66.7	76	118	64.4
1970	19,200	666	933		76	111	

AIR TRANSPORT STATISTICS

	Non-Scheduled, Taxi and Charter				Hours Flown in Other Operations (000s)				Total Hours
Year	hours Flown (000s)	kms Flown (000s)	Passenger km (10^6)	Freight tonnes	Local Flying	Aerial Work Fixed Wing	Aerial Work Heli-copter	Air Training	Non Scheduled Operations
1985									
1984									
1983									
1982									
1981									
1980	24.9	5,331	31,722	1,140	12.5	101.8	45.0	132.3	316.5
1979	36.2	6,222	37,850	1,127	15.4	98.9	40.4	137.9	328.8
1978	44.0	7,647	39,912	2,659	16.4	105.9	39.9	122.5	328.7
1977	46.2	8,305	33,592	1,994	15.6	99.9	32.3	133.0	327.1
1976	37.8	7,417	25,388	1,484	16.3	89.4	34.5	141.5	319.5
1975									
1974									
1973									
1972									
1971									
1970									

TABLE 3.3 (Contd)
AIR TRANSPORT STATISTICS

FUEL DELIVERIES TO AVIATION

	Aviation Gasoline (10^3 litres)				Jet Fuel (10^3 litres)				
Year	Farming & Hunting	Internal Domestic Transport	Other Uses	Total	Farming & Hunting	Internal Domestic Transport	Inter-national Transport	Other Uses	Total
1985	6,601	16,501	1,449	24,551	3,453	120,758	252,949	22,866	400,027
1984	7,365	16,715	1,323	25,402	3,273	115,367	246,567	23,195	388,403
1983	8,106	14,285	1,669	24,060	4,467	87,488	216,658	34,111	342,723
1982	9,608	14,415	1,507	25,529	4,566	80,102	219,761	36,327	340,756
1981	11,771	15,529	1,365	28,665	4,342	85,580	223,459	36,141	349,522
1980	14,027	14,975	1,487	30,489	4,236	103,112	213,873	32,725	353,946
1979	13,853	20,412	1,603	35,869	2,643	121,328	229,691	32,762	386,424
1978	14,521	21,425	1,366	37,311	1,785	119,952	196,706	28,708	347,151
1977	14,258	20,473	2,503	37,235	1,509	117,857	142,234	27,623	289,223
1976	13,176	19,309	4,240	36,725	909	111,338	137,913	24,902	275,063
1975	11,587	18,001	4,737	34,325	463	107,618	135,507	21,634	265,221
1974	6,803	27,089	5,541	39,433	372	101,278	151,693	21,189	274,532

	Aviation Gasoline (TJ)				Jet Fuel (TJ)				
Year	Farming & Hunting	Internal Domestic Transport	Other Uses	Total	Farming & Hunting	Internal Domestic Transport	Inter-national Transport	Other Uses	Total
1985	21.1	52.6	4.6	78.3	11.9	416.6	872.7	78.9	1380.1
1984	23.5	53.3	4.2	81.0	11.3	398.0	850.7	80.0	1340.0
1983	25.9	45.6	5.3	76.8	15.4	301.8	747.5	117.7	1182.4
1982	30.6	46.0	4.8	81.4	15.8	276.4	758.2	125.3	1175.6
1981	37.5	49.5	4.4	91.4	15.0	295.3	770.9	124.7	1205.9
1980	44.7	47.8	4.7	97.3	14.6	355.7	737.9	112.9	1221.1
1979	44.2	65.1	5.1	114.4	9.1	418.6	792.4	113.0	1333.2
1978	46.3	68.3	4.4	119.0	6.2	413.8	678.6	99.0	1197.7
1977	45.5	65.3	8.0	118.8	5.2	406.6	490.7	95.3	997.8
1976	42.0	61.6	13.5	117.2	3.1	384.1	475.8	85.9	949.0
1975	37.0	57.4	15.1	109.5	1.6	371.3	467.5	74.6	915.0
1974	21.7	86.4	17.7	125.8	1.3	349.4	523.3	73.1	947.1

Source: N.Z. Civil Aviation Statistics, Ministry of Transport
Energy Data File, Ministry of Energy
Deliveries of petroleum Fuels to Industry, Dept os Statistics

Note: 1985 energy figures extrapolated from first three quarters

TABLE 3.4
COASTAL SHIPPING STATISTICS

Year	Net Tonnage Inward	No. of Vessels Inward	Mean Net Tonnage	Gross Cargo Tonnage (000s) Inward	Outward	Total	Cargo Tonnage per Call	Cook Straight Ferries
1985								
1984	26548	7579	3,503	6,301	6,269	12,570	1,659	1,877
1983	24228	7845	3,088	5,678	5,643	11,321	1,443	2,153
1982	24243	8178	2,964	5,771	5,371	11,142	1,362	2,250
1981	23261	7966	2,920	6,444	6,370	12,814	1,609	2,205
1980	22755	7796	2,919	5,332	5,193	10,525	1,350	
1979	11440	6782	1,687	7,367	7,216	14,583	2,150	
1978	10506	6741	1,559	7,800	7,328	15,128	2,244	1,872
1977	11178	7639	1,463	8,499	8,137	16,636	2,178	2,010
1976	11303	7778	1,453	8,429	8,030	16,459	2,116	1,902
1975	11081	8257	1,342	7,821	7,232	15,053	1,823	1,952

Notes: (1) prior to 1980, cargo tonnages expressed in manifest tonnes which is a mixture of volume tonnage and weight tonnage. Hence figures before and after that date are not directly comparable

(2) Cook Straight ferry statistics are numbers of round trips.

Source: Abstract of Statistics , N.Z. Railways Corporation Annual Reports

TABLE A3.4 (Contd)
FUEL DELIVERIES TO SHIPPING

Year	Litres (000s) O'seas	Coastal	Fishing	Total	PJ O'seas	Coastal	Fishing	Total
1985	205,959	43,196	68,705	317,860	7.7	1.7	2.5	11.9
1984	292,978	46,961	73,878	413,817	11.0	1.8	2.7	15.5
1983	267,857	31,112	78,886	377,855	10.0	1.2	2.9	14.1
1982	265,007	48,617	90,357	403,981	10.0	1.9	3.3	15.1
1981	359,506	49,227	91,571	500,303	13.7	1.9	3.3	18.9
1980	403,381	53,531	104,346	561,258	15.4	2.1	3.8	21.3
1979	530,440	52,856	52,411	635,708	20.3	2.1	1.9	24.2
1978	389,611	58,454	24,898	472,963	14.8	2.3	0.9	18.0
1977	418,731	65,219	22,136	506,087	15.9	2.5	0.8	19.2
1976	441,819	106,768	20,667	569,253	16.9	4.1	0.7	21.8
1975	368,825	117,438	19,586	505,849	14.2	4.5	0.7	19.4

Notes: (1) Overseas is all deliveries of automotive diesel, marine diesel, and fuel oils to "International Transport".

(2) Coastal is all deliveries of marine diesel oil and fuels oils to "Internal Transport". There is also an unidentified quantity of automotive diesel oil used in coastal shipping which is not included here.

(3) Fishing is deliveries of automotive diesel, marine diesel oil and fuel oils to "Fishing".

Source: Deliveries of Petroleum Fuels to Industry - Dept of Statistics

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Quarterly Summary of Licenced Motor Vehicles, Registrar of Motor Vehicles, N.Z. Post Office, by licence label category and postal district.

New Motor Vehicle Registrations, Registrar of Motor Vehicles, N.Z. Post Office, issued monthly for cars, commercial vehicles, motorcycles and tractors; separate new and ex-overseas lists, cars by make and C.C. category, trucks by make and weight category, motorcycles by make and model, tractors by make.

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Census of Mining and Quarrying
Census of Building and Construction
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Census of Services

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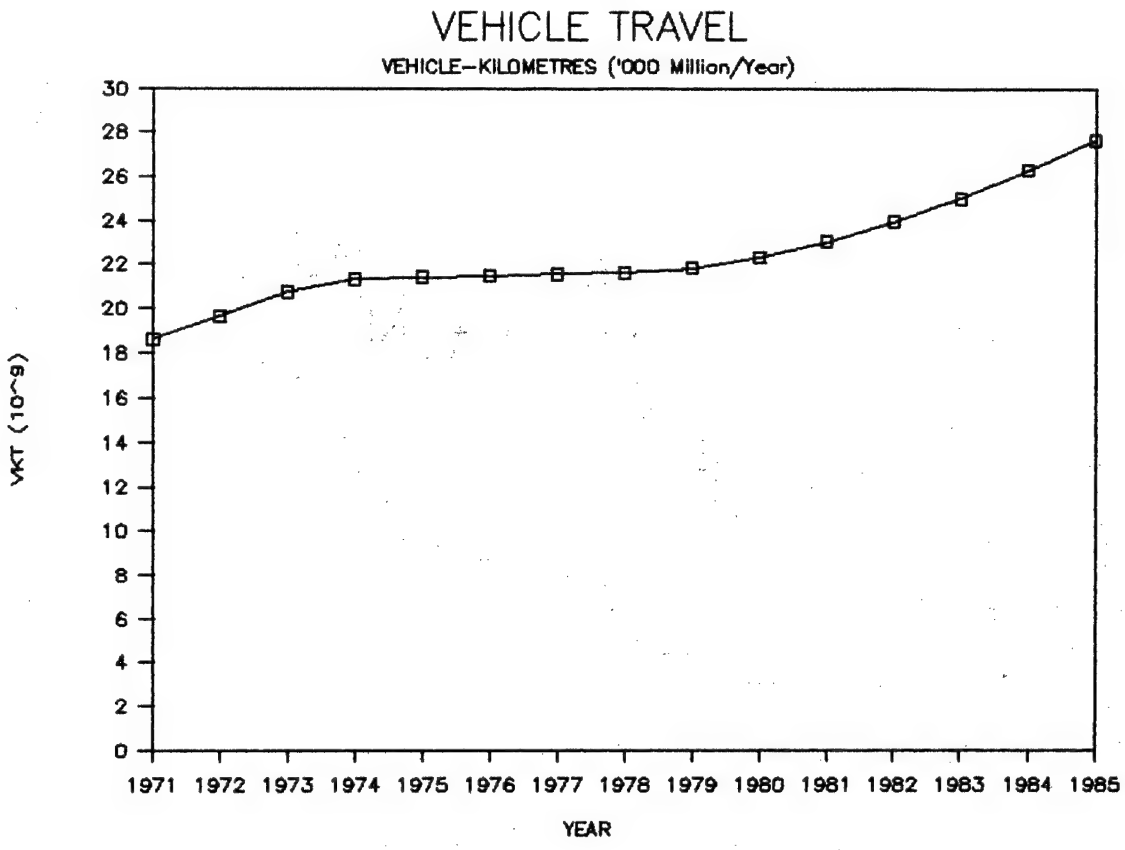
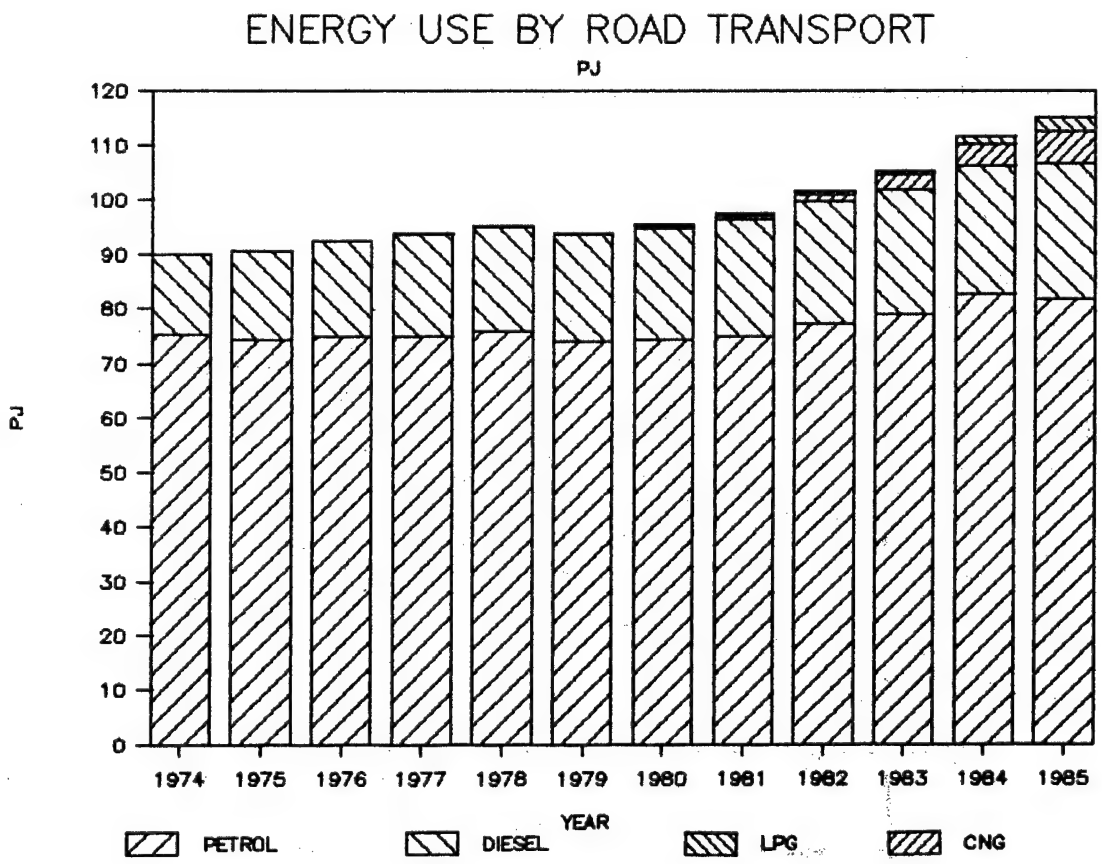
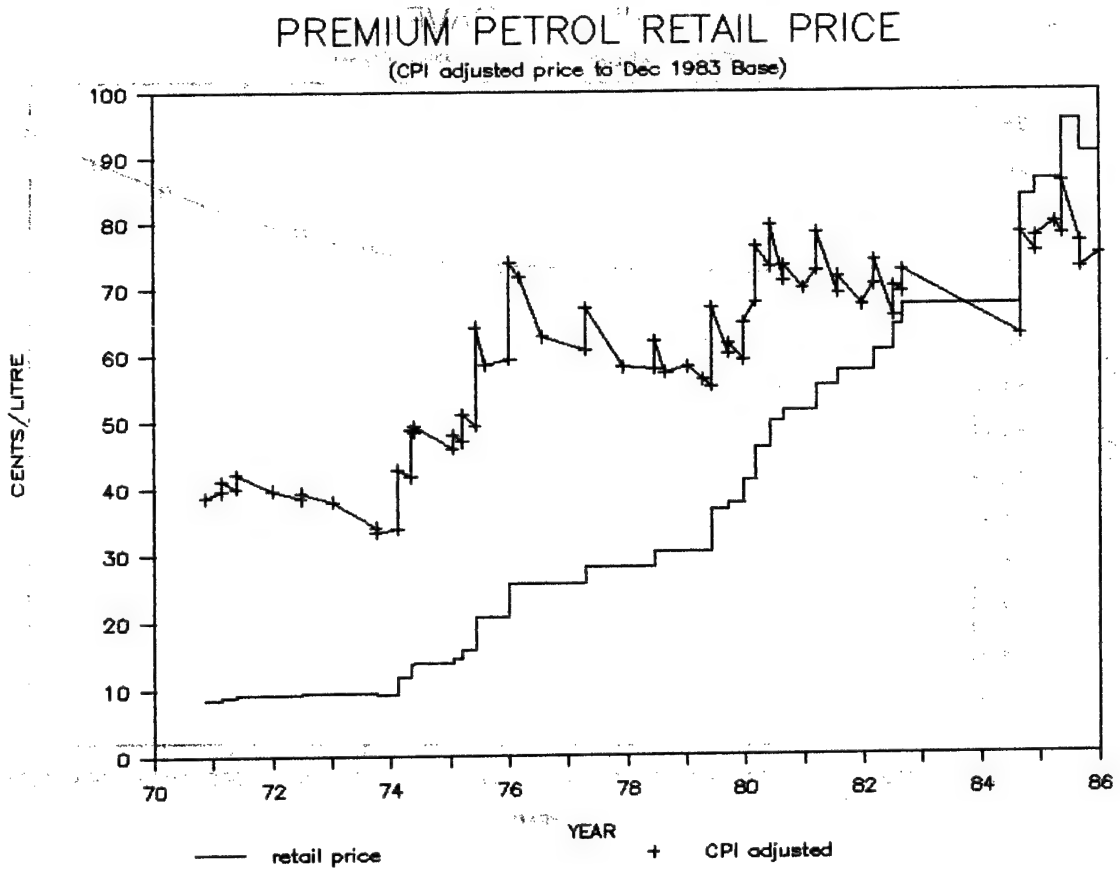
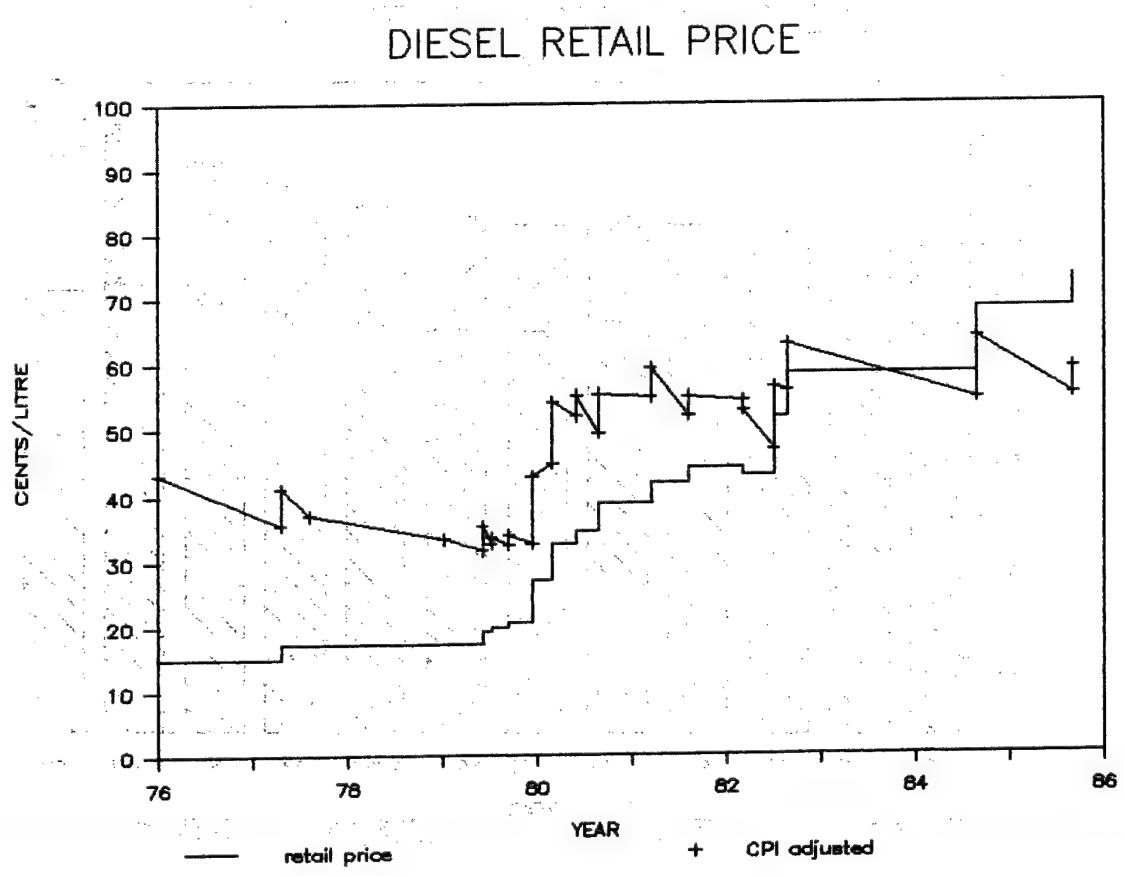
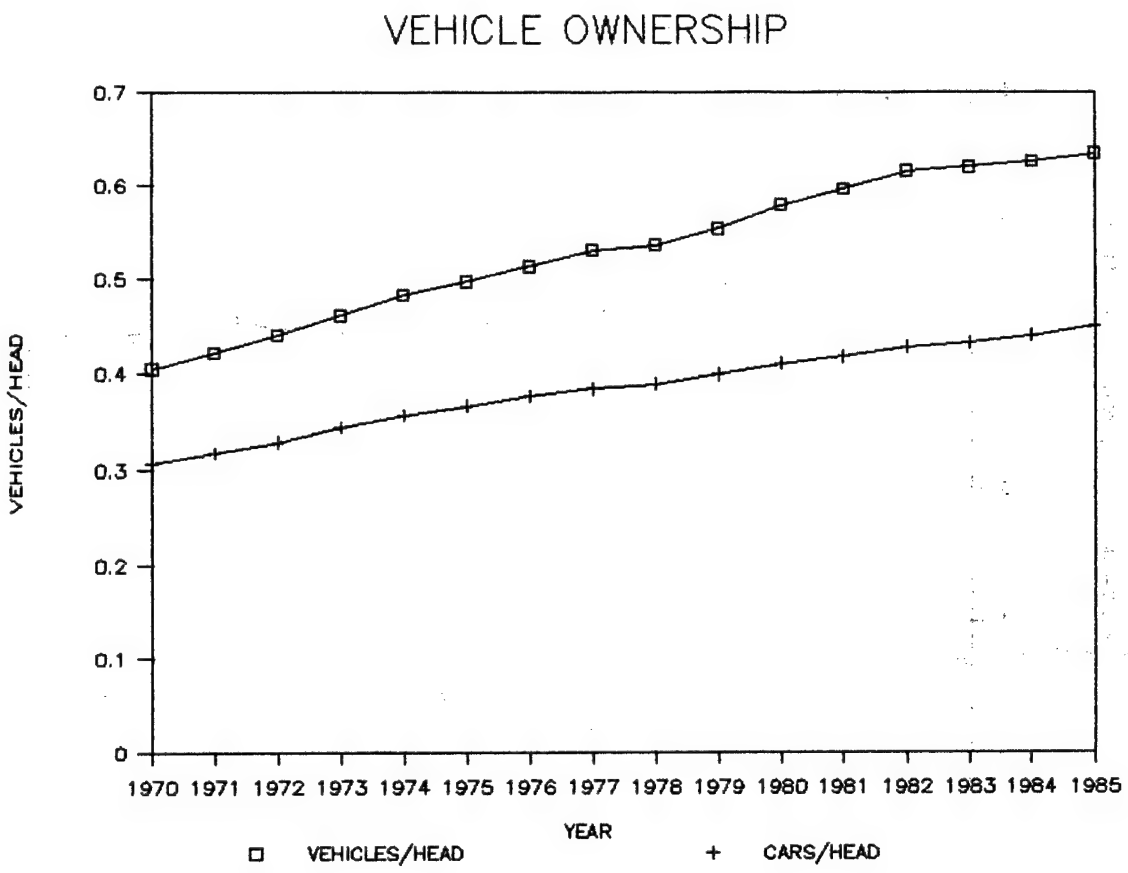
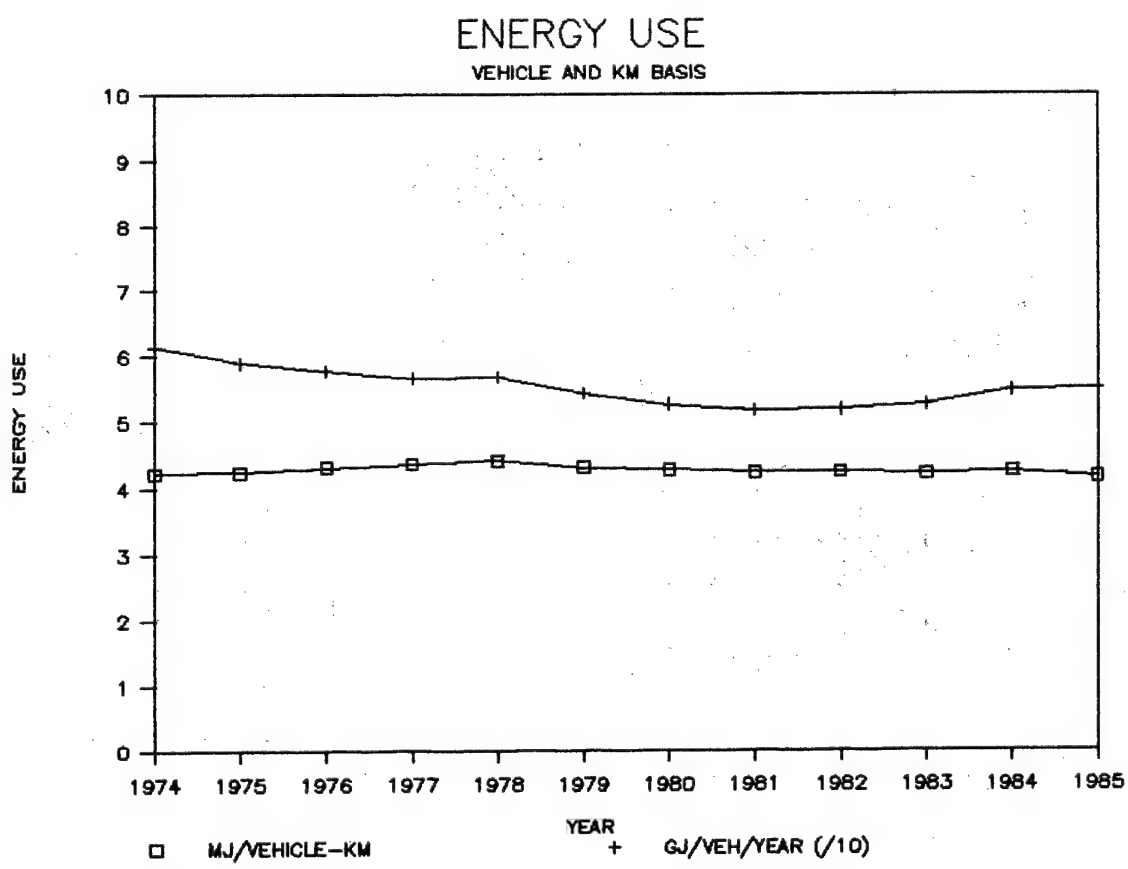

VEHICLE TRAVEL
VEHICLE-KILOMETRES ('000 Million/Year)
VKT (10^9)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985
YEAR


ENERGY USE BY ROAD TRANSPORT
PJ
PJ
120
110
100
90
80
70
60
50
40
30
20
10
0
1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985
YEAR
PETROL
DIESEL
LPG
CNG

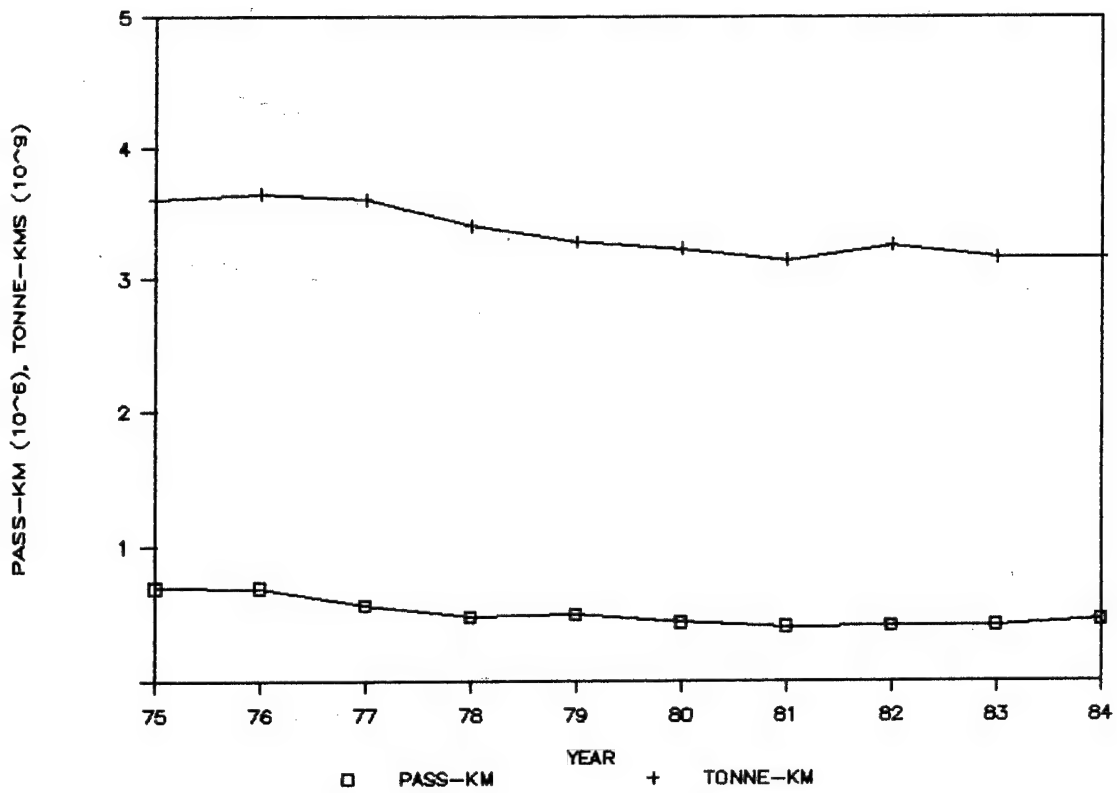

PREMIUM PETROL RETAIL PRICE
(CPI adjusted price to Dec 1983 Base)
CENTS/LITRE
100
90
80
70
60
50
40
30
20
10
0
70
72
74
76
78
80
82
84
86
YEAR
retail price
+ CPI adjusted


DIESEL RETAIL PRICE
CENTS/LITRE
100
90
80
70
60
50
40
30
20
10
0
76
78
80
82
84
86
YEAR
retail price
+ CPI adjusted

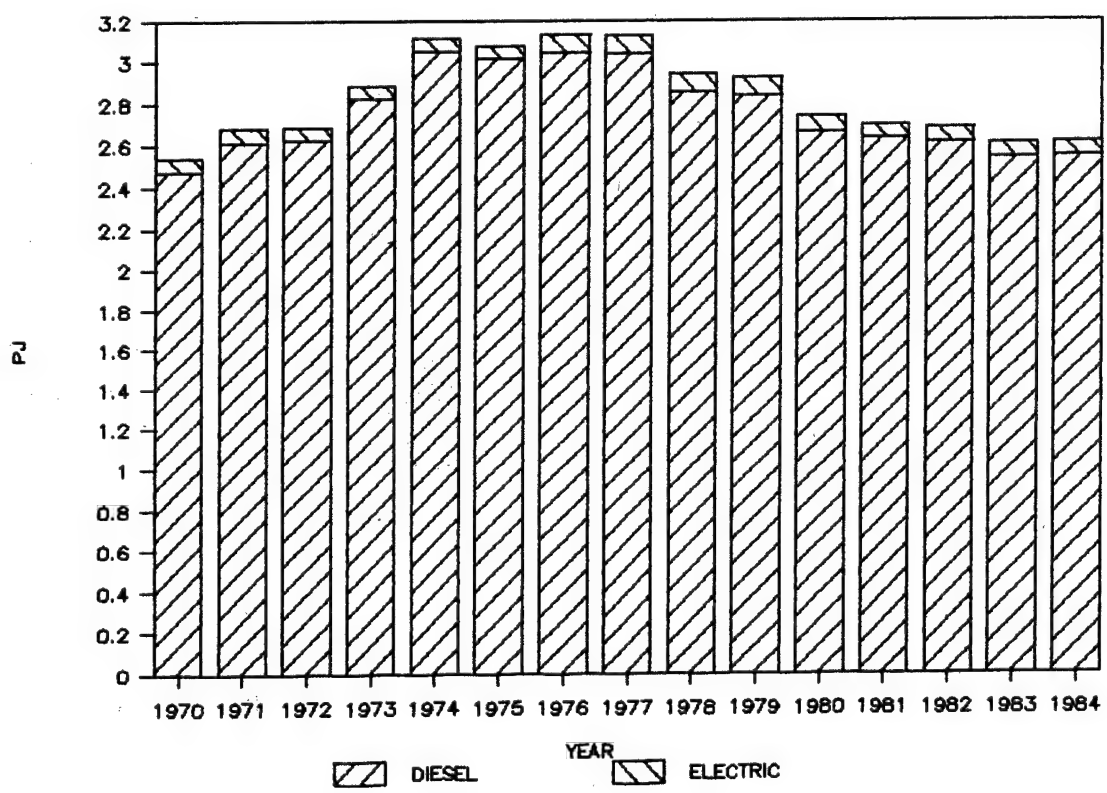

VEHICLE OWNERSHIP
VEHICLES/HEAD
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985
YEAR
VEHICLES/HEAD
CARS/HEAD

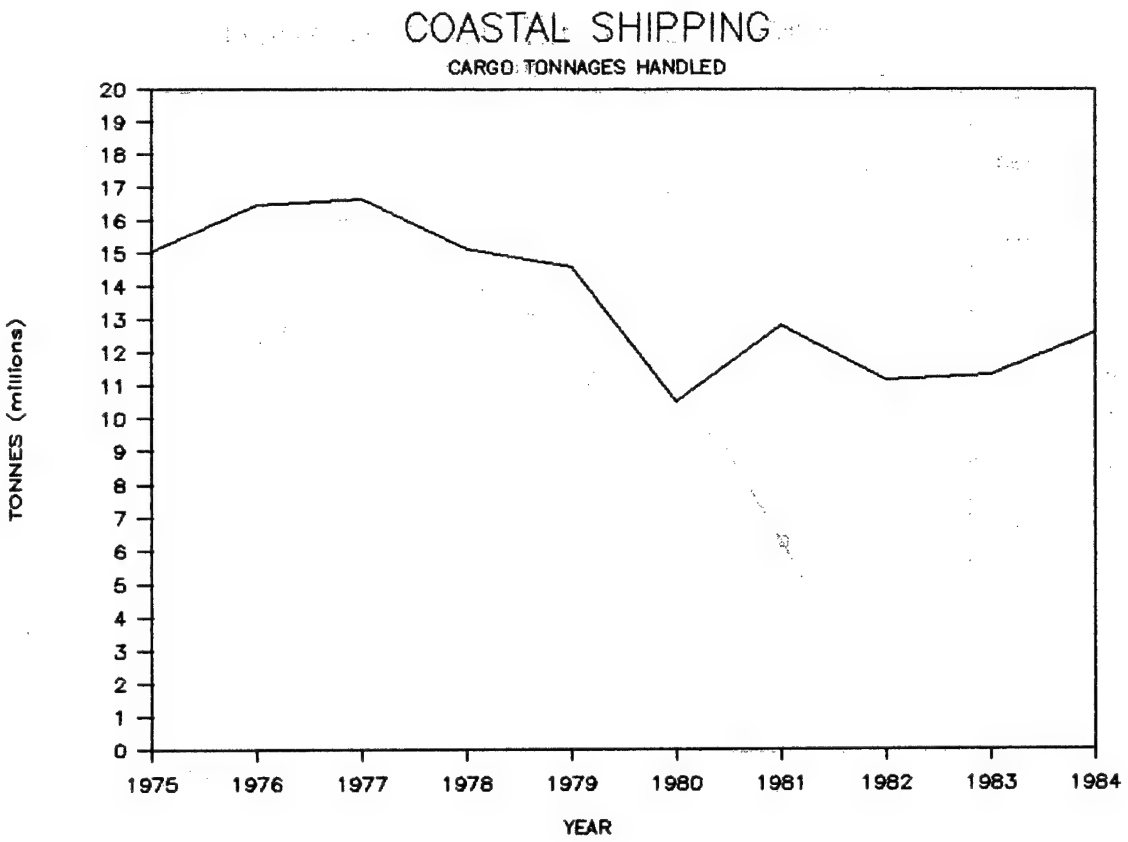

ENERGY USE
VEHICLE AND KM BASIS
ENERGY USE
10
9
8
7
6
5
4
3
2
1
0
1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985
YEAR
MJ/VEHICLE-KM
GJ/VEH/YEAR (/10)

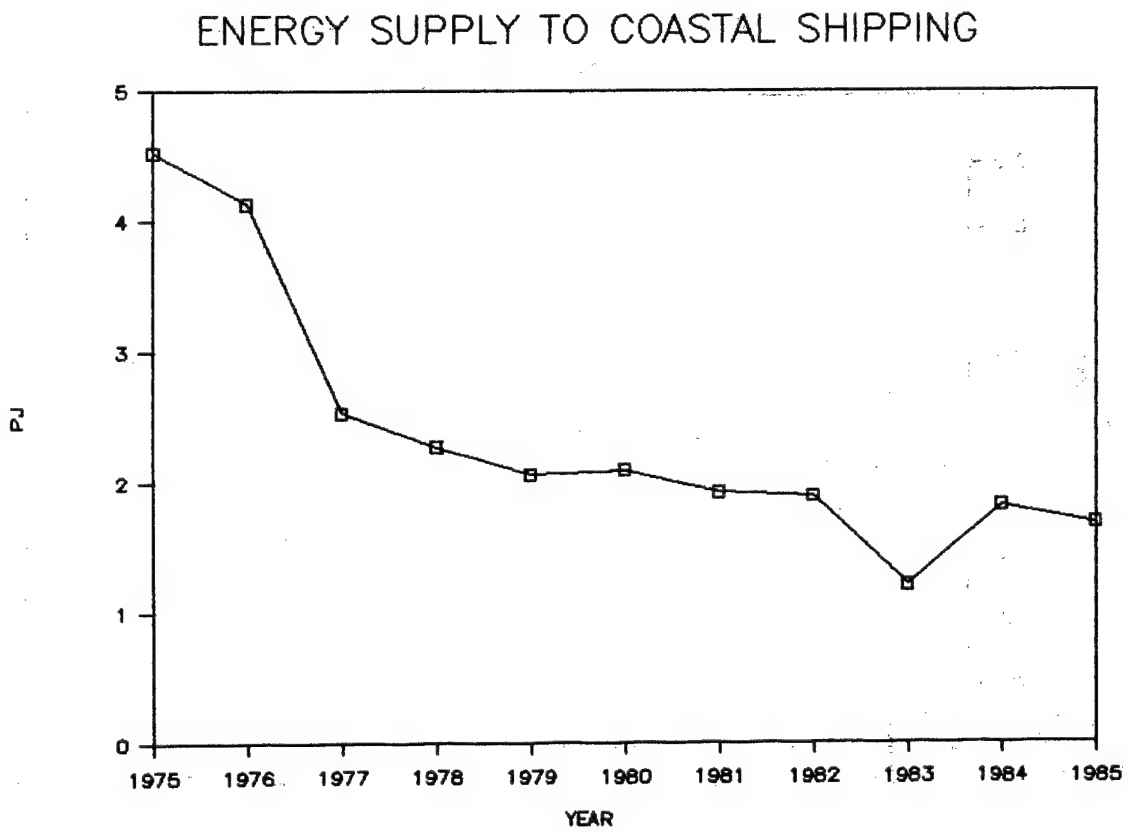
RAIL TRANSPORT VOLUMES

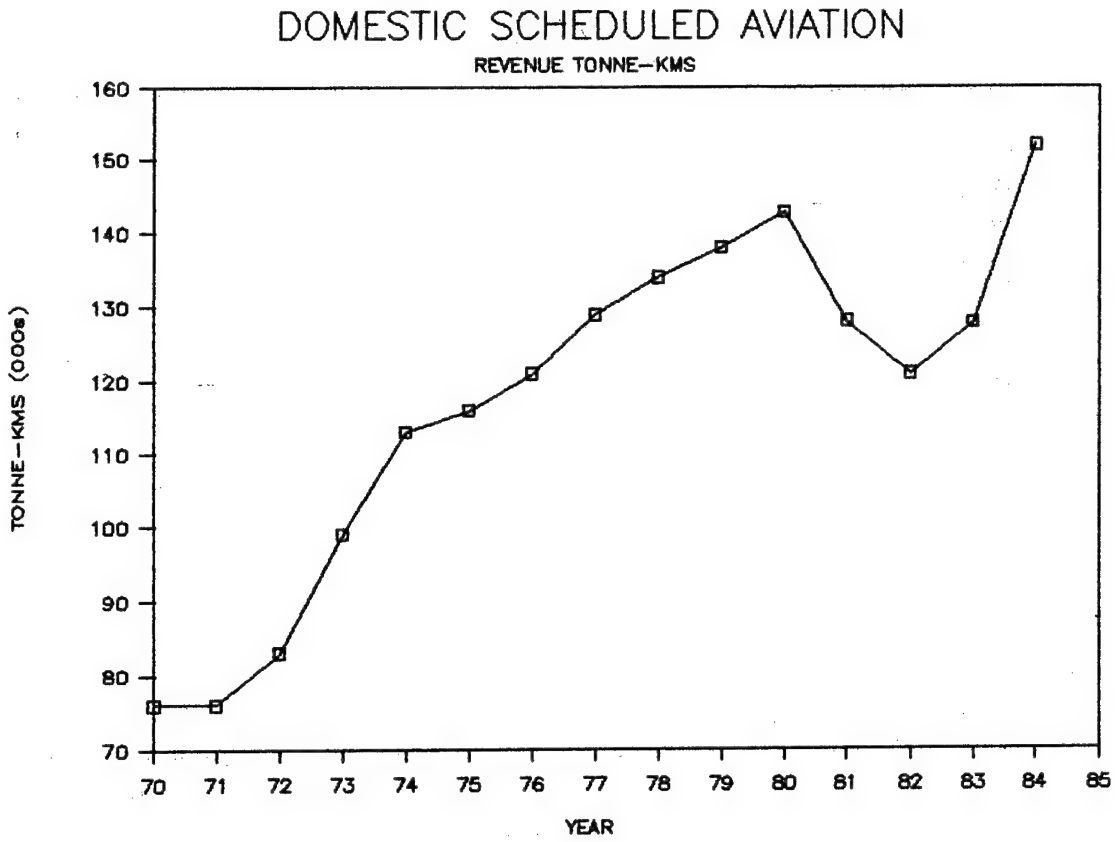


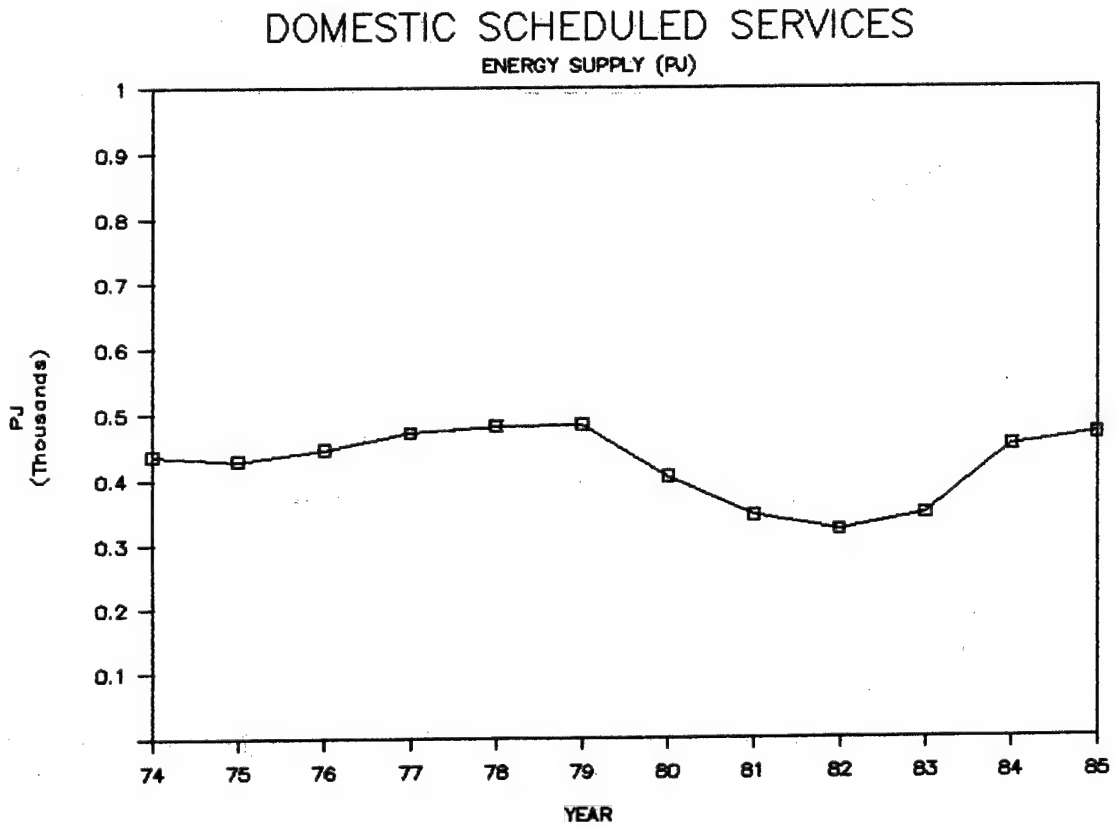
RAIL ENERGY USE




COASTAL SHIPPING
CARGO TONNAGES HANDLED
TONNES (millions)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
YEAR


ENERGY SUPPLY TO COASTAL SHIPPING
PJ
5
4
3
2
1
0
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
YEAR


DOMESTIC SCHEDULED AVIATION
REVENUE TONNE-KMS
TONNE-KMS (000s)
160
150
140
130
120
110
100
90
80
70
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEAR


DOMESTIC SCHEDULED SERVICES
ENERGY SUPPLY (PJ)
PJ
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
74 75 76 77 78 79 80 81 82 83 84 85
YEAR

ENERGY USE IN TRANSPORT

DATA REPORT

APPENDICES

APPENDIX 1

TIME SERIES DATA

A1 TIME SERIES DATA

This Appendix lists the various time series statistics useful to monitoring changes in energy utilisation by the transport sector.

A1.1 Demographic Statistics and Vehicle Ownership

See Table A1.1.

Population and household formation are both of importance. Numbers of households and household incomes are accepted in most transport demand modelling as the best independent variables in determining household ownership of vehicles.

Using the Post Office statistics on vehicle relicensing, an aggregate value of vehicle ownership either of all vehicles or for cars only can be obtained on a population or household basis. These indicators may be extended to include motorcycles. Note that cars include business vehicles and taxis. Since there is no reliable time series to extract business vehicles from the total of cars, this approximation has to be accepted. It is likely that the stock of business vehicles is growing relatively slowly and can be regarded as fixed in comparison with the continued growth in the household stock.

A1.2 Economic Indicators

See Table A1.2.

As noted, household incomes are an important determinant of car ownership. Also, in national models of vehicle ownership developed overseas, and applied on occasion in New Zealand, GDP/capita is another indicator used to model transport demand.

The other main economic indicators are prices. The Consumer Price Index components relating to transport, and the prices of fuel in current dollar and real terms also influence demand.

Since the early 1970s an annual survey of household expenditure has been carried out. Although there have been some changes in the format from year to year, the surveys do provide another useful time series and an insight to changes in transport, including fuel, expenditures.

A1.3 Vehicle Travel

See Table A1.3.

There is a shortage of reliable indicators for road vehicle annual kilometres of travel. The only source with a long history is the analysis of State Highway Traffic Counts carried out annually by the Roading Directorate of Ministry of Wroks. the latest results indicate a recent increase in traffic following a period of low growth in the 1970s. Growth rates over the 1979 to 1984 period are of the order of 5% p.a.

Comparing this index with the vehicle population gives an indicator of changes to vehicle utilisation. Overall utilistion appears to have fallen to a low point around 1981 but has since risen slightly.

A1.4 Fuel Supply

See Tables A1.4 to A1.7.

The data sources and their interpretation are more fully discussed in Appendix A2. Here, the time series of fuel supply statistics for the main transport fuels are tabulated.

Because of the trend towards diesel vehicles for freight transport it is difficult to produce an accurate time series of fuel use on a vehicle or vehicle-kilometre basis. This can only be attempted for petrol vehicles.

Any changes observed in the time series include a number of effects: changing mix of vehicle size; changing proportions of short to long trips; proportion of cold to warm running; proportion of congested to free flow traffic conditions; and technical improvements to the conversion of fuel to useful work.

A1.5 Fuel Prices

See Tables A1.8 and A1.9.

The price history of petrol and diesel is clearly marked through the price fixing regulations for these two fuels. Prices for automotive LPG and CNG are not fixed and vary regionally. Although some data have been obtained from time to time on prices of these fuels, this is not of sufficient frequency to construct a price series.

TABLE A1.1 TIME SERIES OF VEHICLE OWNERSHIP

YEAR	POP'N MEAN CALENDAR YEAR ('000S)	POPULATION VEHICLES ('000S)	POPULATION CARS ('000S)	POPULATION MOTORCYCLES ('000S)	PER HEAD VEHICLES	PER HEAD CARS	PER HEAD CARS AND MOTORCYCLES
1985	3291.3	2,088	1,482	139	0.635	0.450	0.492
1984	3258.3	2,039	1,433	143	0.626	0.440	0.483
1983	3225.5	1,999	1,394	145	0.620	0.432	0.477
1982	3182.9	1,959	1,360	146	0.615	0.427	0.473
1981	3162.1	1,886	1,319	138	0.596	0.417	0.461
1980	3131.3	1,813	1,284	125	0.579	0.410	0.450
1979	3124.4	1,731	1,245	106	0.554	0.398	0.432
1978	3129.4	1,677	1,216	106	0.536	0.388	0.422
1977	3127.7	1,660	1,200	107	0.531	0.384	0.418
1976	3116.2	1,602	1,172	103	0.514	0.376	0.409
1975	3087.0	1,537	1,130	94	0.498	0.366	0.396
1974	3031.9	1,466	1,079	87	0.483	0.356	0.385
1973	2970.8	1,372	1,021	72	0.462	0.344	0.368
1972	2912.9	1,283	955	63	0.441	0.328	0.350
1971	2864.2	1,207	908	53	0.421	0.317	0.336
1970	2819.6	1,140	862	48	0.404	0.306	0.323
1969	2780.1						
1968	2753.5						

1985 population is March estimate from Dept of Statistics

TABLE A1.2 ECONOMIC INDICATORS

HOUSEHOLD EXPENDITURE SURVEYS - dollars/week

March Year	Public Transport Urban	Public Transport Other	Public Transport All	Private Transport Petrol	Private Transport Vehicles	Private Transport Other	Private Transport All	Overseas Travel	All Transport	All Expenditure
1985										
1984										
1983	1.46	1.64	3.10	14.14	18.79	13.96	46.89	5.49	55.46	287.14
1982	1.51	1.29	2.80	12.38	14.65	12.33	39.36	5.40	47.55	268.00
1981	1.30	1.29	2.59	11.42	14.23	11.79	37.44	5.33	45.36	232.66
1980	NA	NA	2.31	NA	NA	NA	31.75	4.25	38.31	202.06
1979	NA	NA	2.13	NA	NA	NA	NA	2.74	NA	NA
1978	NA	NA	1.79	NA	NA	NA	NA	2.46	NA	NA
1977	0.95	0.83	1.78	6.15	7.70	7.76	21.61	2.19	25.59	144.73
1976	0.80	0.69	1.49	5.26	6.70	6.70	19.95	1.67	23.11	124.38
1975	0.70	0.63	1.33	3.88	6.01	6.01	18.27	2.18	21.79	116.52
1983	1.46	1.64	3.10	14.14	18.79	13.96	46.89	5.49	55.46	287.14
1981	1.30	1.29	2.59	11.42	14.23	11.79	37.44	5.33	45.36	232.66
1977	0.95	0.83	1.78	6.15	7.70	7.76	21.61	2.19	25.59	144.73
1975	0.70	0.63	1.33	3.88	8.38	6.01	18.27	2.18	21.79	116.52

HOUSEHOLD EXPENDITURE SURVEYS - percentages

March Year	Public Transport Urban	Public Transport Other	Public Transport All	Private Transport Petrol	Private Transport Vehicles	Private Transport Other	Private Transport All	Overseas Travel	All Transport	All Expenditure
1985										
1984										
1983	2.6	3.0	5.6	25.5	33.9	25.2	84.5	9.9	100.0	19.3
1982	3.2	2.7	5.9	26.0	30.8	25.9	82.8	11.4	100.0	17.7
1981	2.9	2.8	5.7	25.2	31.4	26.0	82.5	11.8	100.0	19.5
1980	NA	NA	6.0	NA	NA	NA	82.9	11.1	100.0	19.0
1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1978	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1977	3.7	3.2	7.0	24.0	30.1	30.3	84.4	8.6	100.0	17.7
1976	3.5	3.0	6.4	22.8	29.0	29.0	86.3	7.2	100.0	18.6
1975	3.2	2.9	6.1	17.8	27.6	27.6	83.8	10.0	100.0	18.7

Source: Dept of Statistics Household Sample Surveys

TABLE A1.2 (Contd)
CONSUMER PRICE INDEX (DEC 83 = 1000)

Year	All Groups	Transport	Public Transport	Private Transport
1985	1209.0	1258	1142	1282
1984	1047.0	1079	1028	1090
1983	987.0	991	997	990
1982	919.0	934	926	936
1981	791.6	810	784	815
1980	685.7	690	627	701
1979	585.7	565	501	576
1978	514.8	490	432	500
1977	459.8	435	368	445
1976	402.2	389	325	399
1975	344.0	314	259	322
1974	299.9	259		
1973	270.0	230		
1972	249.5			
1971	233.4			
1970	211.4			

TABLE A1.3
TIME SERIES OF VEHICLE UTILISATION AND FUEL USE

YEAR	MOWD TRAFFIC COUNT INDEX					VEHICLE-KILOMETRES OF TRAVEL (10^9)		
	as reported		smoothed index					
	Urban	Rural	Urban	Rural	All	Urban	Rural	All
1985					1.936			27.7
1984			1.920	1.730	1.841	15.4	10.9	26.3
1983	1.84	1.61	1.830	1.640	1.751	14.7	10.3	25.0
1982	1.78	1.62	1.750	1.575	1.677	14.0	9.9	24.0
1981	1.66	1.53	1.680	1.520	1.613	13.5	9.6	23.0
1980	1.65	1.39	1.630	1.470	1.564	13.1	9.3	22.3
1979	1.63	1.44	1.590	1.440	1.528	12.7	9.1	21.8
1978	1.54	1.48	1.570	1.435	1.513	12.6	9.1	21.6
1977	1.64	1.42	1.565	1.430	1.508	12.5	9.0	21.6
1976	1.54	1.39	1.560	1.425	1.503	12.5	9.0	21.5
1975	1.58	1.42	1.555	1.420	1.499	12.5	9.0	21.4
1974	1.59	1.41	1.550	1.415	1.494	12.4	8.9	21.3
1973	1.48	1.41	1.480	1.410	1.450	11.9	8.9	20.8
1972	1.40	1.34	1.400	1.340	1.374	11.2	8.5	19.7
1971	1.29	1.28	1.320	1.275	1.301	10.6	8.0	18.6
1970	1.22	1.17	1.240	1.200				
1969	1.12	1.15	1.160	1.140				
1968	1.08	1.07	1.080	1.070				

Note: 1985 traffic index extrapolated

TABLE A1.3 (Contd)
TIME SERIES OF VEHICLE UTILISATION AND FUEL USE

YEAR	ANNUAL KMS PER VEHICLE	ENERGY PER VEH-KM	ENERGY PER VEHICLE PER YEAR	ENERGY SUPPLY TO ROAD TRANSPORT BY FUEL TYPE, PJ				
		MJ/veh-km	GJ/veh	PETROL	DIESEL	CNG	LPG	TOTAL
1985	13,240	0.00	0.0	81.73	25.09	5.78	2.40	115.00
1984	12,899	4.24	54.8	82.55	23.63	4.04	1.39	111.62
1983	12,510	4.21	52.7	78.87	23.16	2.57	0.72	105.32
1982	12,228	4.24	51.9	77.29	22.65	1.17	0.56	101.67
1981	12,222	4.24	51.8	75.12	21.28	0.74	0.49	97.63
1980	12,318	4.27	52.6	74.34	20.54	0.20	0.37	95.44
1979	12,605	4.30	54.2	74.04	19.53	0.05	0.29	93.90
1978	12,897	4.40	56.8	75.92	19.09	0.00	0.22	95.23
1977	12,988	4.36	56.6	75.05	18.70	0.00	0.17	93.92
1976	13,410	4.30	57.7	75.07	17.34	0.00	0.09	92.50
1975	13,937	4.23	59.0	74.28	16.41	0.00	0.00	90.69
1974	14,563	4.21	61.4	75.19	14.73	0.00	0.00	89.92
1973	15,127							
1972	15,327							
1971	15,423							
1970	0							
1969								
1968								

TABLE A1.4
PETROL SUPPLY - ANNUAL BASIS (Source: Oil Company Deliveries to Industry,Dept of Statistics)

YEAR	Premium Petrol			Regular Petrol			Total Petrol			To Road Transport	
	Tonnes x10^6	Litres x10^6	PJ	Tonnes x10^6	Litres x10^6	PJ	Tonnes x10^6	Litres x10^6	PJ	Litres x10^6	PJ
1985	1,499.0	2,053.4	70.84	125.5	177.3	5.96	1,624.5	2,230.7	76.80	2,119.2	72.96
1984	1,557.6	2,133.7	73.61	146.7	207.2	6.96	1,704.4	2,341.0	80.58	2,229.3	76.73
1983	1,612.5	2,209.0	76.21	63.5	89.7	3.02	1,676.1	2,298.7	79.22	2,185.7	75.33
1982	1,650.9	2,246.2	77.81	33.7	47.3	1.59	1,684.6	2,293.4	79.40	2,179.1	75.44
1981	1,610.9	2,191.7	75.92	39.6	55.7	1.88	1,650.5	2,247.4	77.80	2,131.8	73.80
1980	1,597.2	2,173.0	75.27	52.8	74.2	2.50	1,650.0	2,247.2	77.77	2,130.2	73.73
1979	1,587.9	2,160.3	74.83	61.4	86.2	2.91	1,649.2	2,246.5	77.74	2,129.1	73.68
1978	1,618.3	2,201.8	76.27	73.8	103.7	3.50	1,692.2	2,305.5	79.77	2,187.7	75.69
1977	1,590.2	2,163.5	74.94	84.6	118.9	4.01	1,674.8	2,282.4	78.95	2,164.3	74.87
1976	1,574.6	2,142.3	74.21	103.1	144.8	4.88	1,677.6	2,287.0	79.09	2,167.9	74.97
1975	1,531.2	2,083.2	72.16	132.2	185.7	6.26	1,663.4	2,269.0	78.43	2,149.1	74.28
1974	1,542.7	2,099.0	72.71	140.3	197.0	6.65	1,683.0	2,296.0	79.35	2,175.4	75.19

TABLE A1.5
DIESEL SUPPLY - ANNUAL BASIS (Source: Oil Company Deliveries to Industry,Dept of Statistics)

YEAR	Automotive Diesel			Road Transport		Marine Diesel Oil		
	Tonnes x10^6	Litres x10^6	PJ	Litres x10^6	PJ	Tonnes x10^6	Litres x10^6	PJ
1985	1,040.4	1,249	47.71	656.8	25.09	9.9	11.4	0.45
1984	1,047.9	1,258	48.05	618.7	23.63	17.8	20.5	0.81
1983	1,011.3	1,214	46.38	606.3	23.16	20.0	23.0	0.90
1982	1,020.4	1,218	46.88	588.3	22.65	22.1	25.8	1.00
1981	980.3	1,170	45.04	552.8	21.28	22.0	25.7	0.99
1980	1,037.7	1,238	47.68	533.4	20.54	24.0	28.0	1.08
1979	984.9	1,175	45.25	507.2	19.53	45.3	52.8	2.04
1978	988.3	1,179	45.41	495.9	19.09	41.8	48.8	1.88
1977	1,006.2	1,201	46.23	485.8	18.70	51.9	60.6	2.34
1976	941.7	1,124	43.27	450.3	17.34	53.9	62.8	2.42
1975	880.6	1,051	40.46	426.2	16.41	62.4	72.8	2.81
1974	866.3	1,034	39.80	382.7	14.73	20.4	23.7	0.92

TABLE A1.6
GAS FUELS SUPPLY TO TRANSPORT

Year	CNG and LPG Supply to Transport					Equivalent Petrol Supply (CNG + LPG + Petrol)	
			Equivalent PJ of Petrol				
	PJ CNG	PJ LPG	CNG	LPG	CNG & LPG	Litres (10^6)	PJ
1985	5.78	2.40	6.24	2.53	8.77	2,374	81.73
1984	4.04	1.39	4.36	1.46	5.82	2,398	82.55
1983	2.57	0.72	2.78	0.76	3.54	2,288	78.87
1982	1.17	0.56	1.26	0.59	1.85	2,233	77.29
1981	0.74	0.49	0.80	0.52	1.32	2,170	75.12
1980	0.20	0.37	0.22	0.39	0.61	2,148	74.34
1979	0.05	0.29	0.05	0.31	0.36	2,140	74.04
1978		0.22		0.23	0.23	2,194	75.92
1977		0.17		0.18	0.18	2,170	75.05
1976		0.09		0.10	0.10	2,171	75.07
1975						2,149	74.28
1974						2,175	75.19

Source: Ministry of Energy - CNG, Consultants Etimates - LPG, see text
Note: 1985 figures are projections from part year data

TABLE A1.7
SUPPLY OF AVIATION FUELS

Year	Aviation Gasoline (Avgas)			Aviation Turbine Fuel (Avtur)		
	Tonnes ('000s)	Litres (10^6)	PJ	Tonnes ('000s)	Litres (10^6)	PJ
1985	17.8	12.7	0.41	325.8	259.0	8.94
1984	18.2	13.0	0.42	308.8	245.5	8.47
1983	17.2	12.3	0.39	272.5	216.6	7.47
1982	18.3	13.1	0.42	270.9	215.4	7.43
1981	20.5	14.7	0.47	278.0	221.0	7.62
1980	21.9	15.7	0.50	291.5	231.7	8.00
1979	25.7	18.4	0.59	307.2	244.2	8.43
1978	26.7	19.1	0.61	276.0	219.4	7.57
1977	26.7	19.1	0.61	229.9	182.8	6.31
1976	26.3	18.8	0.60	218.7	173.9	6.00
1975	24.6	17.6	0.56	210.9	167.7	5.78
1974	33.7	24.1	0.77	208.7	165.9	5.72

Source: Ministry of Energy, Energy Data File; Dept Of Statistics

TABLE A1.8
PETROL PRICE HISTORY

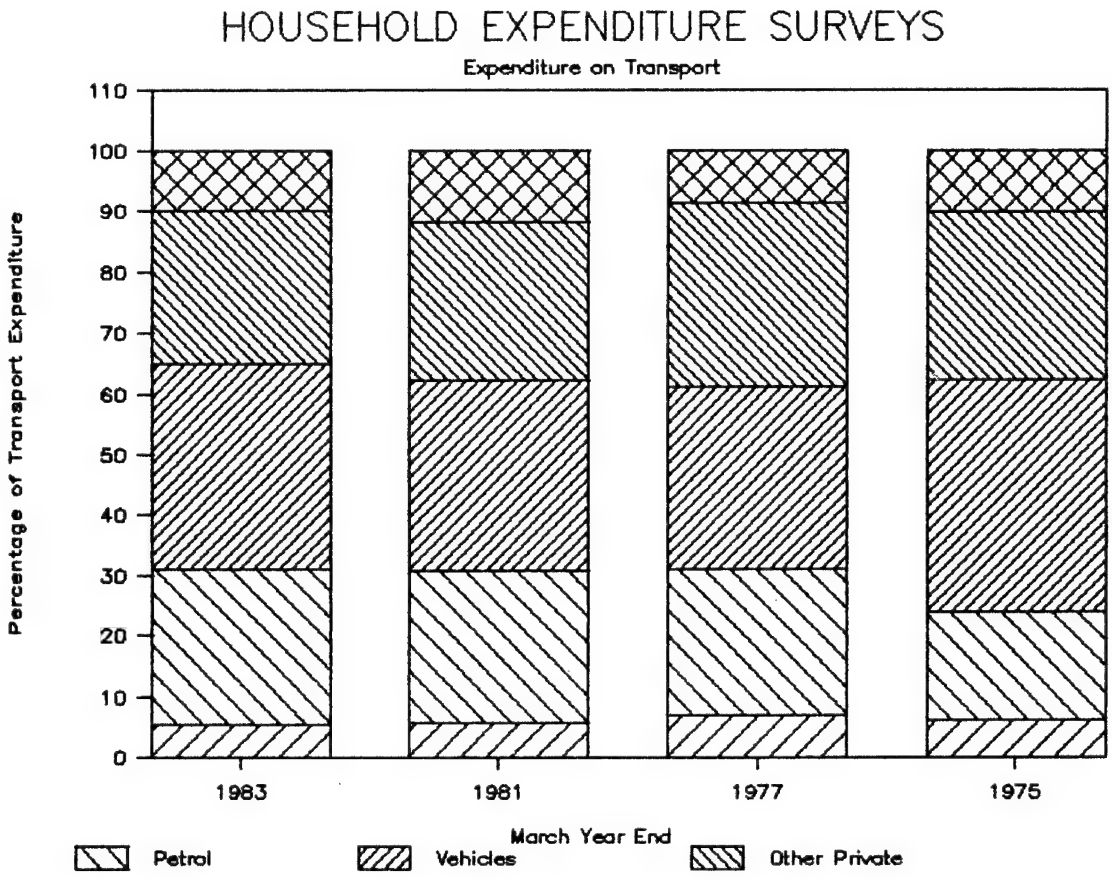
Regulation		Regular (cents/litre)			Premium (cents/litre)		
Am.	Effective Date	Retail	Bulk	Wholesale	Retail	Bulk	Wholesale
Regs	28-Oct-70	8.47	7.51	6.56	9.13	8.15	7.17
1	01-Feb-71	8.80	7.84	8.80	9.46	8.48	7.50
2	04-May-71	9.24	8.28	7.33	9.90	8.92	7.94
3	17-Dec-71	9.24	8.20	7.17	9.90	8.84	7.78
4	08-Jun-72	9.46	8.42	7.39	10.12	9.06	8.00
5	21-Dec-72	9.46	8.36	7.25	10.12	8.99	7.87
6	14-Sep-73	9.24	8.11	6.98	9.90	8.75	7.59
7	24-Jan-74	11.66	10.53	9.40	12.32	11.17	10.01
8	19-Apr-74	13.64	12.51	11.38	14.30	13.15	11.99
9	02-May-74	13.86	12.51	11.16	14.52	13.15	11.77
10	01-Jan-75	14.50	metric conversion		15.20	metric conversion	
11	25-Feb-75	15.74	14.99	14.34	16.64	15.89	15.24
12	19-May-75	20.44	19.69	19.04	21.34	20.59	19.94
13	16-Jul-75	20.44	19.69	18.79	21.34	20.59	19.69
14	15-Dec-75	25.44	24.69	23.79	26.34	25.59	24.69
15	16-Feb-76	25.44	24.69	23.67	26.34	25.59	24.57
16	05-Jul-76	25.44	24.69	23.61	26.34	25.59	24.51
17	31-Mar-77	28.04	27.29	25.98	28.94	28.19	26.88
18	14-Nov-77	28.04	27.29	25.84	28.94	28.19	26.74
19	29-May-78	30.04	29.29	27.84	30.94	30.19	28.74
20	01-Aug-78	30.04	29.29	27.73	30.94	30.19	28.63
21	24-Dec-78	30.04	29.29	27.59	30.94	30.19	28.49
22	26-Mar-79	30.04	29.29	27.22	30.94	30.19	28.12
24	17-May-79	36.44	35.69	34.22	37.94	37.19	34.92
25	28-Aug-79	37.34	36.59	34.32	38.84	38.09	35.82
26	27-Nov-79	40.84	40.09	37.70	42.34	41.59	39.20
27	11-Feb-80	45.84	45.09	42.53	47.34	46.59	44.03
28	12-May-80	49.84	49.09	46.53	51.34	50.59	48.03
29	04-Aug-80	51.34	50.59	47.71	53.34	52.59	49.51
30	01-Dec-80	51.34	50.59	47.36	53.34	52.59	49.36
Regs	24-Feb-81	55.34	54.59	51.36	57.34	56.59	53.36
1	07-Jul-81	57.34	56.59	52.84	60.34	59.59	55.84
2	30-Nov-81	57.34	56.59	52.52	60.34	59.59	55.52
3	16-Feb-82	60.34	59.59	55.52	63.34	62.59	58.52
4	14-Jun-82	64.34	63.59	58.93	67.34	66.59	61.93
5	05-Aug-82	67.34	66.59	61.93	70.34	69.59	64.93
6	07-Aug-84	83.84	83.09	78.01	86.84	86.09	81.01
7	09-Nov-84	86.34	85.59	80.51	89.34	88.59	83.51
8	05-Mar-85	86.34	85.59	80.26	89.34	88.59	83.26
9	26-Apr-85	95.34	94.59	89.26	98.34	97.59	92.26
10	15-Aug-85	90.34	89.59	83.55	93.34	92.59	86.55

Source - Motor Spirits Prices Regulations 1967,1970 and 1981

TABLE A1.9
AUTOMOTIVE DIESEL PRICE HISTORY

Regulation		cents/litre			cents/litre	
Am.	Effective Date	Retail	Bulk	Wholesale	Farm	Household
	16-Dec-63		3.3	3.1	3.3	3.3
	20-Jan-64		3.2	3.0	3.2	3.2
	01-Jul-64		3.2	3.0	3.2	3.2
	04-Sep-64		3.2	3.0	3.2	3.2
	21-Oct-64		3.1	2.9	3.1	3.1
	12-Jul-65		3.0	2.8	3.0	3.0
	01-Dec-65		3.0	2.8	3.0	3.0
	10-Jul-67		3.0	2.8	3.0	3.0
	21-Aug-67		3.0	2.9	3.0	3.0
	01-Sep-67		3.1	3.0	3.1	3.1
	01-Nov-67		3.3	3.1	3.3	3.3
	01-Jan-68		3.5	3.4	3.5	3.5
	01-Jun-68		3.5	3.4	3.5	3.7
	01-Feb-71		3.6	3.5	3.6	3.8
	08-Jun-72		3.8	3.7	3.8	4
	25-Jan-74		6.0	5.9	6.0	6.2
	19-Apr-74		8.7	8.6	8.7	8.9
Regs	26-Feb-75		9.5	9.2		9.7
1	15-Dec-75	14.9	14.2	13.9		14.4
2	31-Mar-77	17.2	16.5	16.2		16.7
3	18-Jul-77	17.2	16.5	16.2		
4	18-Dec-78	17.2	16.5	16.2		
5	16-May-79	19.2	17.5	17.2		
6	20-Jun-79	19.7	18.0	17.7		
7	27-Aug-79	20.6	19.6	18.6		
8	26-Nov-79	27.0	26.0	25.0		
9	11-Feb-80	32.6	31.6	30.6		
10	12-May-80	34.6	33.6	32.6		
11	04-Aug-80	38.8	37.8	36.8		
12	24-Feb-81	41.9	40.9	39.9		
13	20-Jul-81	44.2	43.2	41.2		
14	16-Feb-82	43.0	47.0	45.0		
15	14-Jun-82	51.8	50.8	48.8		
16	05-Aug-82	58.5	57.5	55.5		
17	07-Aug-84	68.5	67.5	65.5		
18	15-Aug-85	73.3	71.3	69.3		

Source - Motor Spirits Prices Regulations 1967 and 1970


HOUSEHOLD EXPENDITURE SURVEYS
Expenditure on Transport
Percentage of Transport Expenditure
110
100
90
80
70
60
50
40
30
20
10
0
1983
1981
1977
1975
March Year End
Petrol
Vehicles
Other Private

A10

APPENDIX 2

FUEL SUPPLY STATISTICS AND END USE

A2 FUEL SUPPLY STATISTICS AND END USE

This appendix discusses the data sources used for fuel supply statistics and the manner of classification into N.Z. Standard Industrial Classification and by form of fuel consuming equipment.

The allocation of petrol and diesel supply to transport end use is described.

A2.1 Fuel Supply Statistics

The principal source is the Department of Statistics "Deliveries of Petroleum Fuels to Industry". The column totals for the calendar years are used as the overall control totals in the analysis for all fuels except LPG and CNG.

For premium and regular grade petrol, weekly returns of oil company deliveries provide an alternative source of data.

Also available are the statistics prepared by the National Roads Board from information supplied by the Customs Department on motor spirits duty. The NRB is responsible for refunding motor spirits duty to exempt vehicles.

Lastly, there are the statistics of Local Authority Petroleum Tax. Returns are available showing the quantity of fuel on which tax has been paid.

Each set of statistics shows small differences resulting from the manner and scope of their collection.

For CNG, the source is the Ministry of Energy's "Energy Data File" which lists monthly CNG sales in GJ.

For LPG there is at present no source of data on the use of the product by industrial sectors or into transport/non-transport uses. The monthly deliveries of natural gas liquids, which comprise LPG's and natural gasoline, are also taken from the Energy Data File. A control total has been derived using data on non-transport use from the "Domestic Markets for LPG" report to (En-Consult Technology Ltd, 1982).

The small amount of electrical energy used in transport is reported directly from the bus operators involved.

A2.2 Definitions of Form of End Use

Fuel use has been divided into four categories as follows:

Non-Vehicles	stationary equipment or trailer mounted equipment; includes stationary engines, space heating, process heat, etc.
Mobile Equipment	powered equipment which moves in the process of work; not being the carriage of people, goods or information; includes fishing and aerial work.
Off-road Transport	Carriage of people, goods or information between separated locations of activity, but not on roads open to public access; also includes sea, rail and air transport.
On-road Transport	as above, but on roads open to public access.

A2.3 NZSIC Sector Classification

The N.Z. Standard Industrial Classification is used as the basis for assigning fuel use by industry sector. Table A2.1 shows the classificaiton with a detailed subdivision of the transport sector.

A2.4 Petrol

The "Supply of Petroleum Fuels to Industry" annual statistics are used as the control total. The two grades of automotive gasoline are added together. Aviation gasoline is considered separately.

The supply statistics contain an NZSIC classification but this is of little use in the case of petrol because of the large quantities traded through resellers.

The assignment of petrol has therefore proceeded as follows:

(a) petrol use in agriculture is dealt with in Appendix A5 and is deducted from the control total. Farm households are assigned to Category 99 with other households for this purpose.

(b) petrol use in buses, heavy commercial vehicles, taxis and rental cars, and two wheel vehicles is dealt with in the appendices A9 to A12 and is deducted from the residual petrol supply after (a).

(c) petrol use by central government administration, (i.e. NZSIC 9101) is deducted. This amount is obtained as discussed in Appendix A13.

TABLE A2.1
N.Z. STANDARD INDUSTRIAL SECTOR CLASSIFICATION

NZSIC Code	Description
1	AGRICULTURE, FORESTRY AND FISHING
11	Agriculture and Hunting
12	Forestry and Logging
13	Fishing
2	MINING AND QUARRYING
3	MANUFACTURING
38	Fabricated metal products, machinery and equipment
3 remainder	Other Manufacturing
4	ELECTRICITY, WATER AND GAS
5	BUILDING AND CONSTRUCTION
6	WHOLESALE AND RETAIL TRADE, RESTAURANTS AND HOTELS
61	Wholesale Trade
62	Retail Trade
6281	Motor Vehicle Dealers, Parts and Wreckers
62 remainder	Other Retail Trade
63	Restaurants and Hotels
7	TRANSPORT, STORAGE AND COMMUNICATIONS
71	Transport and Storage
711	Land Transport
7111	Railway Transport
7112/3	Road Passenger Transport
71121	Urban Bus Passenger Services
71122	Route Passenger Bus Services
71131	Taxi Services
71132	School Bus Contractors
71133	Bus Tour Operators
71139	Other Road Passenger transport
7114	Road Freight Transport
71141	Logging Haulage
71142	Stock Haulage
71143	Refrigerated Haulage
71144	Heavy Haulage
71145	Bulk Haulage
71146	Furniture Removal
71147	Route Haulage
71148	General Carrier
71149	Other Road Freight Transport
7116	Other Land Transport
71161	Car and Truck Rentals
71162	Vehicle Parking Facilities
71169	Other Supporting Services to Land Transport
712	Water Transport
71210	Ocean and Coastal Transport
71220	Inland Water Transport
71231	Harbour Board Operations
71233	Stevedoring
71239	Other Supporting Services to Water Transport
713	Air Transport
71310	Air transport carriers
71321	Aero Clubs
71322	Airport Operations
71329	Supporting Services to Air Transport
719	Supporting Services to Transport
7191	Travel and Freight Agents ertc
7192	Storage and Warehousing
72	Communications
72001	Post Office
72009	other Communications

TABLE A2.1 (Contd)
N.Z. STANDARD INDUSTRIAL SECTOR CLASSIFICATION

NZSIC Code	Description
8	FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES
9	COMMUNITY, SOCIAL AND PERSONAL SERVICES
91	Public Administration and Defence
9101	Central Government Administration
91011	General Administration
91012	Defence
91013	Education
91014	Health
91015	Social Welfare
91016	Industrial, Commercial and Labour Services
91017	Fire Services Commission
9102	Local Government Administration
92	Sanitary and Similar Services
93	Social and Related Community Services
94	Recreational and Cultural Services
95	Personal and Household Services
96	International and Extra-Territorial Bodies
(99)	(HOUSEHOLDS)

Notes: Aerial Top Dressing is included in NZSIC 11241,
Deer recover in NZSIC 11319
Class 99 Households is not part of the NZSIC but has been numbered as such for convenience

(d) petrol use by off-road mobile machinery and vehicles is discussed in Appendix A5 and is deducted from the residual petrol supply after (c).

(e) petrol use in transport, storage and communication (NZSIC 71, 72) not covered in item (c), is deducted from the residual petrol supply after (d). This amount is found using the Census of Transport Storage and Communications and Appendix A13.

(f) non-vehicle use is estimated for forestry (NZSIC 12), building and construction (NZSIC 5) and by households (NZSIC 99) and is deducted from the residual petrol supply after (e).

(g) petrol use in fishing (NZSIC 13) and in pleasure craft (NZSIC 99) is estimated and is deducted from the residual petrol supply after (f).

This leaves on-road transport excluding all heavy vehicles; agriculture; the transport industry; communications; and central government administration.

(h) petrol use in remaining non-household light commercial vehicles and cars is determined as discussed in Appendices A6 and A7 and this is deducted from the residual petrol supply after (g).

The remaining petrol is assumed to be all assigned to vehicles licensed as cars belonging to households.

The effect of this assignment process for 1984 and earlier calendar years is shown in Tables A2.2 and A2.3.

A2.5 Diesel Supply and Use

Reconciliation of diesel supply to industrial sectors and estimates of use in vehicles has proved difficult in the past. Recent studies have greatly improved the level of information although some questions still remain.

A2.5.1 Estimate of Use by Transport and Other Vehicles

Estimates of use are summarised in Table A2.4. Points to note are the large and poorly defined use by mobile machines as opposed to road transport use. The derivation of the estimates for mobile machines is given in Appendix A7. An unknown number of unregistered mobile machines (never used on public roads) are omitted from the Table.

A2.5.2 . Comparison with Diesel Use Survey - General

An important source of data on

TABLE A2.2
ASSIGNMENT OF PETROL TO END USES

NZSIC CATEGORY	DESCRIPTION	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
	TOTAL DELIVERIES	2229.6	2341.0	2298.7	2293.4	2247.4	2247.2	2246.5	2305.5	2282.4	2287.0	2269.0	2296.0
	Non-Vehicle Uses:												
11 Agriculture	¦ power	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12 Forestry	¦ saws etc	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5 Construction	hoists etc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
99 Household	farm	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	other	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
	NON-VEHICLE USES	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
	Mobile Equipment:												
11 Agriculture	tractors,harvester	12.6	13.9	15.1	16.4	17.7	19.0	19.8	20.7	21.5	22.8	24.0	25.2
13 Fishing		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
5 Construction	const equip.	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4
71 Transport		3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
99 Household	farm	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	other	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	MOBILE EQUIPMENT	63.0	64.3	65.5	66.8	68.1	69.4	70.2	71.1	71.9	73.2	74.4	75.6
	Off-Road Transport:												
6	farm trucks	11.5	11.8	12.0	12.3	12.6	12.8	12.7	12.5	12.3	12.2	12.1	12.0
	farm bikes	6.6	6.4	6.2	6.0	5.8	5.6	5.3	5.0	4.7	4.4	4.1	3.8
3 Manufacture	fork lifts	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
5 Construction	trucks	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
61 Wholesale ¦	fork lifts	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
62 Retail ¦		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	OFF-ROAD TRANSPORT	25.9	25.9	26.0	26.0	26.0	26.1	25.7	25.2	24.7	24.4	24.0	23.5
Residual	ON-ROAD TRANSPORT	2119.2	2229.3	2185.7	2179.1	2131.8	2130.2	2129.1	2187.7	2164.3	2167.9	2149.1	2175.4

diesel fuel supply to industrial sectors and forms of end use is the "Diesel Use in New Zealand" report to the Liquid Fuels Trust Board (Gabites, Porter Partners 1981). It is based upon a sample survey of diesel use by industrial sector as classified from returns by the oil industry to the Department of Statistics. The survey noted a fair amount of misallocation among industrial sectos, which it corrected, and went on to allocate diesel by form of end use within each sector. Of interest to this report are the allocations to:

transport - defined as vehicles licensed for on road use.

other vehicles - land vehicles not licensed for on road use.

stationary engines - compressors, generators etc.

All other end uses are non-automotive with the exception of "other uses" which include diesel used in marine engines. Personal communication with the Department of Statistics and results of the NZERDC research into agricultural use of fuel have suggested some amendments to the sector allocations. These are described below and tabulated in Table A2.4.

A2.5.3 Agriculture and Hunting

The diesel use survey reduced the oil company figures by 70%, reallocating use as follows:

35% to food manufacturing (dairy factories, grain drying)

10% to transport

25% to resale via agricultural service firms

In view of the practice of farms being charged for fuel deliveries through local dairy factories, service stations, agricultural contractors and stock and station agents, and also in view of the fact that the use of diesel by farmers and agricultural contractors

TABLE A2.3
ASSIGNMENT OF PETROL TO ON ROAD VEHICLES BY TYPE OF VEHICLE

DESCRIPTION	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
ON-ROAD TRANSPORT	2119.2	2229.3	2185.7	2179.1	2131.8	2130.2	2129.1	2187.7	2164.3	2167.9	2149.1	2175.4
Cars:												
Taxis	6.2	9.4	13.3	17.3	20.1	22.3	24.8	28.9	29.2	29.5	29.7	29.6
Rental Cars	40.7	29.8	28.7	25.2	24.7	23.9	22.1	22.3	23.8	21.8	21.3	20.3
Business	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2	485.2
Household - farm	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4
Household - other	775.3	872.9	800.6	775.4	743.0	760.4	767.9	847.0	825.4	861.8	836.3	863.9
CARS	1411.8	1501.6	1432.2	1407.4	1377.4	1396.2	1404.4	1487.7	1467.9	1502.6	1476.9	1503.4
Light Commercials:												
Rental	6.3	4.6	4.4	3.9	3.8	3.7	3.4	3.4	3.7	3.4	3.3	3.1
Licensed Transport	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Ancillary Business	386.0	405.4	405.6	399.9	368.0	346.3	341.0	309.2	295.9	249.0	236.3	231.3
Farms	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
Households	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
LIGHT COMMERCIALS	501.8	519.5	519.5	513.3	481.3	459.5	453.9	422.1	409.1	361.9	349.1	343.9
Heavy Commercials:												
Licensed Transport	29.0	29.0	35.1	40.9	44.8	45.7	45.7	47.4	49.6	53.8	60.1	61.5
Ancillary Business	77.0	77.0	93.1	108.6	118.9	121.5	121.5	126.0	131.8	142.7	159.5	163.3
Public Bodies	33.0	33.0	39.9	46.5	50.9	52.1	52.1	54.0	56.5	61.2	68.3	70.0
HEAVY COMMERCIALS	119.5	119.5	144.5	168.5	184.5	188.5	188.5	195.5	204.5	221.5	247.5	253.5
Buses:												
Transport	32.5	34.3	34.6	34.8	35.1	35.3	35.5	35.7	36.0	36.2	36.5	36.8
Ancillary	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
BUSES	52.0	53.8	54.1	54.3	54.6	54.8	55.0	55.2	55.5	55.7	56.0	56.3
MOTOR/POWER CYCLES	28.3	29.1	29.6	29.7	28.1	25.3	21.5	21.3	21.4	20.3	13.8	12.5
MISCELLANEOUS	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
TOTAL ON-ROAD	2119.2	2229.3	2185.7	2179.1	2131.8	2130.2	2129.1	2187.7	2164.3	2167.9	2149.1	2175.4

inferred from vehicle holdings and other surveys (see Appendix A5) is of similar magnitude to oil company deliveries, the above reallocation of oil company figures has not been sustained in this report. However, uncertainities leave the matter open to further discussion.

Deliveries of fuel to "Households" are advised by the Department of Statistics to be in fact deliveries to rural households, i.e. farm deliveries. The diesel use survey, however, found that almost all diesel allocated to this sector is actually used in transport operations. The residual "Household" use has been added to "Agriculture and Hunting".

The oil company deliveries have been increased to the total estimated for farm deliveries (120 million litres) plus agricultural contractors use on farm (18 million litres) with the correction taken up by adjustment to resellers.

A2.5.4 Other Primary Industry

"Forestry and Logging" has been increased by about 40% as found by the diesel use survey.

"Mining and Quarrying" has been increased by over 100% on similar grounds.

A2.5.5 Manufacturing

"Food Manufacture" follows the diesel use survey except that 35% of "agriculture and hunting" has not been reallocated (see A2.5.3 above).

TABLE A2.4
ASSIGNMENT OF AUTOMOTIVE DIESEL TO END USES

Sector	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
TOTAL DELIVERIES	1249.0	1257.9	1214.0	1217.7	1169.8	1238.3	1175.3	1179.4	1200.7	1123.8	1050.9	1033.8
Non-Engine Uses:												
11 Agriculture	21.3	22.8	22.6	23.7	21.7	24.2	21.6	23.1	23.8	22.1	22.2	20.6
12 Forestry	2.1	2.3	2.3	2.4	2.2	2.4	2.2	2.3	2.4	2.2	2.2	2.1
13 Mining	2.1	2.3	2.3	2.4	2.2	2.4	2.2	2.3	2.4	2.2	2.2	2.1
3 Manufacture												
-Food	24.5	26.2	26.0	27.2	24.9	27.8	24.9	26.6	27.3	25.4	25.5	23.7
-Iron & Steel	6.4	6.8	6.8	7.1	6.5	7.3	6.5	6.9	7.1	6.6	6.7	6.2
-Other	52.2	55.8	55.4	58.1	53.1	59.2	53.0	56.6	58.2	54.1	54.4	50.6
4 Elect. & Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 Construction	4.3	4.6	4.5	4.7	4.3	4.8	4.3	4.6	4.8	4.4	4.4	4.1
Other Uses	79.9	85.4	84.8	88.9	81.3	90.7	81.2	86.7	89.1	82.7	83.3	77.4
NON-ENGINE USES	192.8	206.1	204.6	214.4	196.1	218.8	195.9	209.2	215.0	199.7	200.9	186.7
Stationary Engines:												
11 Agriculture	4.3	4.6	4.5	4.7	4.3	4.8	4.3	4.6	4.8	4.4	4.4	4.1
12 Forestry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 Mining	3.2	3.4	3.4	3.6	3.3	3.6	3.2	3.5	3.6	3.3	3.3	3.1
3 Manufacture												
-Food	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Iron & Steel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 Elect. & Gas	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.0
5 Construction	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.0
Other Uses	2.1	2.3	2.3	2.4	2.2	2.4	2.2	2.3	2.4	2.2	2.2	2.1
STATIONARY ENGINES	11.7	12.5	12.4	13.0	11.9	13.3	11.9	12.7	13.1	12.1	12.2	11.3
Off-Road Vehicles:												
11 Agriculture	111.8	119.6	118.7	124.4	113.8	126.9	113.6	121.4	124.7	115.8	116.6	108.3
12 Forestry	16.0	17.1	17.0	17.8	16.3	18.1	16.2	17.3	17.8	16.5	16.7	15.5
13 Mining	20.2	21.6	21.5	22.5	20.6	23.0	20.6	22.0	22.6	21.0	21.1	19.6
3 Manufacture												
-Food	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.0
-Iron & Steel	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.0
-Other	16.0	17.1	17.0	17.8	16.3	18.1	16.2	17.3	17.8	16.5	16.7	15.5
4 Elect. & Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 Construction	38.3	41.0	40.7	42.7	39.0	43.5	39.0	41.6	42.8	39.7	40.0	37.1
Other Uses	13.8	14.8	14.7	15.4	14.1	15.7	14.1	15.0	15.4	14.3	14.4	13.4
OFF-ROAD VEHICLES	218.3	233.5	231.7	242.9	222.1	247.8	221.8	236.9	243.5	226.1	227.6	211.5

"Iron and Steel" and "Other Manufacturing" follow the small changes made in the diesel use survey, including a reallocation from "Other" to "Forestry and Logging".

A2.5.6 Other Industry Sectors

No change has been made to "Electricity" and "Gas". "Building and Construction" is reduced as found in the Diesel Use Survey, by reallocating part of the use to"Other Mining and Quarrying".

"Other Uses" comprise commercial and government in the main, but the Diesel Use Survey identified an amount more correctly classified as "Resellers" which has been reallocated.

A2.5.7 Comparison with the Diesel Use Survey - Automotive Uses

Table A2.4 illustrates the breakdown of diesel deliveries into transport (licensed for on-road use), other vehicles (not licensed for on-road use), stationary engines and other uses (heating and chemical applications and other uses). The first two sections therefore represent all automotive use and the first three sections represent all use in internal combustion engines.

A2.6 Gas Fuels, CNG and LPG

CNG sales statistics are published by the Ministry of Energy in the "Energy Data File".

TABLE A2.4 (Contd)
ASSIGNMENT OF AUTOMOTIVE DIESEL TO END USES

Sector	1984	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
On-Road Vehicles:												
11 Agriculture	16.0	17.1	17.0	17.8	16.3	18.1	16.2	17.3	17.8	16.5	16.7	15.5
12 Forestry	12.8	13.7	13.6	14.2	13.0	14.5	13.0	13.9	14.3	13.2	13.3	12.4
13 Mining	18.1	19.4	19.2	20.1	18.4	20.6	18.4	19.6	20.2	18.8	18.9	17.5
3 Manufacture												
- Food	18.1	19.4	19.2	20.1	18.4	20.6	18.4	19.6	20.2	18.8	18.9	17.5
- Iron & Steel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- Other	24.5	26.2	26.0	27.2	24.9	27.8	24.9	26.6	27.3	25.4	25.5	23.7
4 Elect. & Gas	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.0
5 Construction	29.8	31.9	31.6	33.2	30.3	33.8	30.3	32.4	33.3	30.9	31.1	28.9
Other Uses	56.4	60.4	59.9	62.8	57.4	64.1	57.4	61.3	63.0	58.5	58.8	54.7
Sub-Total	176.8	189.1	187.6	196.7	179.9	200.7	179.6	191.9	197.2	183.1	184.3	171.3
7 Transport - Road												
- Resellers	192.3	173.4	148.1	133.3	122.6	118.6	144.0	137.1	116.9	98.2	96.8	96.4
- Road Transport	135.2	121.5	105.3	96.0	120.9	127.7	119.5	114.4	125.2	127.4	92.9	93.1
Sub-Total	327.6	294.9	253.4	229.3	243.5	246.4	263.5	251.5	242.1	225.5	189.7	189.5
ON-ROAD VEHICLES	504.4	484.0	441.0	426.0	423.4	447.0	443.1	443.4	439.3	408.6	374.0	360.7
7 Transport - Other												
- Rail Transport	79.0	79.0	79.0	79.0	79.0	79.0	78.7	79.3	84.4	84.6	83.6	84.8
- Coastal Shipping	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
- O'seas Shipping	160.5	160.5	163.0	160.0	155.0	150.0	141.6	115.5	123.0	110.3	70.2	96.4
OTHER TRANSPORT	321.5	321.5	324.0	321.0	316.0	311.0	302.3	276.8	289.4	276.9	235.8	263.2
TOTAL TRANSPORT	825.9	805.5	765.0	747.0	739.4	758.0	745.4	720.2	728.7	685.5	609.8	623.9
TOTAL DELIVERIES	1248.7	1257.6	1213.7	1217.3	1169.5	1238.0	1175.0	1179.0	1200.3	1123.5	1050.6	1033.5

ASSESSMENT OF DIESEL USE IN TRANSPORT FROM VEHICLE FLEET AND UTILISATION DATA

VEHICLE TYPE	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Light Goods Vehicles	9.6	9.5	9.2	8.9	8.2	7.8	7.6	7.1	6.9	6.1	5.8	5.8
Heavy Goods Vehicles	506.0	475.0	464.0	446.0	411.0	393.0	368.0	359.0	351.0	318.0	296.0	254.0
Buses	36.1	29.1	28.0	28.3	28.5	27.5	26.5	24.7	22.8	21.1	19.3	17.8
Miscellaneous	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1
ON-ROAD VEHICLES	656.8	618.7	606.3	588.3	552.8	533.4	507.2	495.9	485.8	450.3	426.2	382.7
Tractors	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Trucks	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Forklifts	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Machines	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
OFF-ROAD VEHICLES	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8
ON- & OFF-ROAD	759.6	721.5	709.1	691.1	655.6	636.2	610.0	598.7	588.6	553.1	529.0	485.5
COMPARE ABOVE	722.7	717.5	672.7	668.9	645.5	694.9	665.0	680.3	682.8	634.8	601.6	572.2

LPG sales for automotive use are not officially reported and must be inferred from the overall supply totals, from industry information and from maketing studies. Details are given in Appendix A14.

A 18

APPENDIX 3

ROAD VEHICLES, DESCRIPTION AND CLASSIFICATION

A3 ROAD VEHICLES, DESCRIPTION AND CLASSIFICATION

Much of the data relevant to energy use in transport originates from statistical summaries compiled by various official agencies involved in vehicle regulation and taxation. This appendix discusses the various data sources, the definitions in use and the correlation between them.

A3.1 Governing Legislation

The following legislation is relevant to this discussion:

Transport Act (1962/135) - provides for motor vehicle registration, annual licencing, transport service licencing, third party insurance, warrants and certificates of fitness and motor spirits duty levy and refund.

Transport Amendment Act (No.2))1983/33) introduced quality licensing for road transport and removed road/rail competition.

Transport Amendment Act (1984/7) contains the most recent amendments regarding motor spirits duty and sales tax refund.

Motor Vehicle Registration and Licencing Regulations (1965/82) - under the Transport Act, these regulations provide for licence categories and exemptions from payment of licence fees. Amendment No. 8 (1980/87) is also relevant.

Road User Charges Act (1977/124) - this Act provides for taxation of vehicles according to axle load and gross weight. The latest amendment governing specified vehicle categories is No. 1984/23.

Motor Spirits Duty Refund Regulations (1978/28) - under the Transport Act, these regulations detail exemptions from motor spirits duty and eligibility for refund.

Accident Compensation Act (1982/121) - provides for a surcharge to be imposed on the motor vehicle annual relicencing fee as a funding contribution to the Accident Compensation Corporation.

Accident Compensation Motor Vehicle Levies Order (1974/106) - defines terms used in the Motor Vehicle Registration and Licencing Regulations (1965/82).

Passenger Service Vehicle Construction Regulations (1978/15) - defines various vehicle construction categories and relates these to transport licensing categories.

A3.2 Vehicle Construction Definitions

The following definitions are used to define motor vehicles by form of construction and function. The precise wording may be found in the interpretation of the Transport Act 1962, the Motor Vehicle Registration and Licensing Regulations 1965 and the Passenger-Service Vehicle Constructional Regulations 1978.

Vehicle - is a contrivance equipped with wheels, tracks or runners; powered or unpowered; but excludes most human-powered devices such as children's bicycles, trundlers, trolleys; also pedestrian operated lawnmowers; and pedestrian controlled agricultural machines not propelled by mechanical power.

Motor Vehicle - is a vehicle drawn or propelled by mechanical power and includes a trailer but excludes rail vehicles, invalid carriages, Defence Department armament trailers and pedestrian controlled machines. A truck and detachable trailer is therefore classed as two vehicles.

Motorcar - is a motor vehicle designed exclusively or principally for the carriage of up to nine persons inclusive of the driver and includes station wagons, hatchbacks and vans fitted with seats to convert them to passenger use.

Goods-Service Vehicle - is a motor vehicle designed exclusively or principally for the carriage of goods but excludes a tractor.

Passenger Service Vehicle - a motor vehicle used for the carriage of passengers for hire or reward with or without goods (Transport Act definition), or:

- a motor vehicle designed exclusively or principally for the carriage of more than nine passengers, including the driver, or:
- a heavy (over 2 tonne) motor vehicle used regularly for the carriage of passengers except where such a vehicle carries no more than three persons (inclusive of the driver) in the cab of the vehicle, or:
- a rental car

Heavy Motor Vehicle - A heavy motor vehicle means a motor vehicle, other than a motor car which is not used for carriage of passengers for hire or reward (i.e. heavy privately operated motor cars are excluded), which exceeds 2,000 kg gross weight. Gross weight is the weight of any vehicle or vehicle combination together with the load, and any equipment or accessories (Transport Act definition. The Heavy Motor Vehicle Regulations 1974 also exclude traction engines and fire brigade vehicles in relation to operation on roads of various classes and requirements for overload permit etc.)

Tractor - is a motor vehicle, excluding a traction engine, designed principally for traction at speeds not exceeding 50 km/hr. This definition therefore excludes tractor units of road truck combinations. (A traction engine is a motor vehicle propelled by steam power and designed for on-road use for carriage of goods or passengers).

Trailer - is a vehicle without motive power that is capable of being drawn or propelled by a motor vehicle from which is readily detachable; does not include vehicles on temporary tow; does include the semi-trailer section of an articulated vehicle where this is readily detachable.

Caravan - is a motor vehicle, other than a trailer, designed for use as a human abode.

Motor Cycle - a motor vehicle running on 2 wheels, or 3 wheels if a sidecar is attached, but excluding a moped.

Moped - a pedal vehicle running on 2 or 3 wheels that for alternative propulsion is filled with a motor; or a motor vehicle running on 2 wheels that for alternative propulsion is fitted with pedals; in each case the motor output must be below 2 kW. Previously called "Power Cycle".

Omnibus - a passenger service vehicle, the body of which is designed for the carriage of both seated and standing passengers.

Service Coach - a passenger service vehicle, the body of which is designed principally for the carriage of seated passengers but excluding an ambulance, rental car, school bus, school vehicle or taxi cab.

School Bus - a passenger service vehicle, the body of which is designed solely or principally for the carriage to and from school of school children.

Passenger Truck - passenger service vehicle which, although designed principally for the carriage of goods, has for the time being been made suitable for the carriage of passengers.

A3.3 Vehicle Use Definitions

The following definitions are related to vehicle use, particularly in defining vehicles used for a transport service, being the operation of a vehicle for hire or reward, and ancillary vehicles.

Passenger Service - a motor vehicle used for the carriage of passengers for hire or reward, with or without goods.

Goods-Service - the carriage of goods for hire or reward by means of a motor vehicle; but does not include the carriage of goods by their owner.

Rental Vehicle (Car) - vehicle (car) used in a rental service which is the letting of a motor vehicle on hire (not under a hire purchase agreement or on a bailment exceeding 6 months) for the carriage of passengers and/or goods to a person who himself drives the vehicle or provides a driver.

Taxicab - is a motor vehicle designed for the carriage of up to eight persons, used for hire or reward, not on defined routes and available for public hire. A public taxicab is one let on hire from a public place; other taxicabs are private taxicabs.

A taxicab is a passenger service vehicle.

Public Motor Vehicle - a motor vehicle plying for hire for the carriage of persons or used in the course of the business of carrying persons for hire; but excluding contract motor vehicles, motorcycles, or carriage of persons as defined under V licence.

Contract Vehicle - is a motor vehicle carrying passengers for hire or reward under a written contract which specifies the occasion and period of hire; includes unwritten contracts for carriage by taxicabs; but excludes contracts evidenced by issue of a ticket and hire purchase agreements.

School Vehicle - any stock model motorcar or any motor vehicle so designated by the Secretary for Transport and used for the carriage to and from school of school children.

A3.4 Requirement to be Registered

All motor vehciles must be registered under Section 7 of the Transport Act 1962 1962 unless:

(a) they are not used on any road, a road being defined as any place to which the public have access, whether of right or not; so use on private roads still demands that a vehicle be registered unless public access is prevented.

(b) the vehicle is a trailer designed exclusively for agricultural operations and is only used on a road when proceeding from farm to farm.

(c) the vehicle is on temporary tow.

Vehicles used exclusively off-road do not need to be registered.

A3.5 Exemption from Registration and Annual Licencing Fees

Registered motor vehicles exempt from fees for registration and annual licence fees are (Motor Vehicle Registration and Licensing Regulations 1965, Section 2A):

1. (a) any motor vehicle not used on the public highway (that is only on private roads).

(b) used in crossing or operating on the road for purposes of road maintenance or construction works.

(c) used within a road construction zone.

(d) pedestrian-controlled goods-service vehicles.

(e) vehicles solely propelled and supported by self laying tracks.

(f) trailers towed by farm vehicles exempt from Motor Spirits Duty (see below) except for aerial top dressing trucks and aircraft fuel trailers and trailers not taken more than 21 kilometres from the usual place of garage in any one trip.

(g) trailers in (f) when used in charitable work or community purposes.

2. any vehicles so gazetted.

A3.6 Exemption from Payment of Motor Spirits Duty

Motor vehicles exempt from MSD and therefore eligible for refunds under Section 188 of the Transport Act are scheduled in the Motor Spirits Duty Refund Regulations 1978. These are declared to be "exempt vehicles" for the purposes of Section 188 of the Act (see below). They include:

Part 1 - use of agricultural vehicles on road for agricultural purposes

Part 2 - certain mobile machines

Part 3 - miscellaneous non-agricultural tractors, forklift trucks and trailers

Part VIII of the Transport Act 1962 contained sections 187 to 191 dealing with Motor Spirits Duty and Mileage Tax (the old tax on diesel vehicles). Part VIII was repealed in the 1982 Transport Amendment Act (1982/10) and a new section substituted. Section 189 corresponds to old section 188 and provides for refunds of MSD for:

(i) exempted vehicles (see above)

(ii) licenced (Road User Charges) vehicles

(iii) passenger-service (under transport licence, contract vehicle or in school transport) vehicles.

(iv) goods-service (under a goods-service licence excluding exempted and Road User Charges licence vehicles) vehicle

(v) commercial vehicles

(vi) commercial purposes other than in motor vehicles, vessels or aircraft.

Refunds of Sales Tax for CNG and LPG powered vehicles are applicable for categories (i) and (ii) above and (iii) for commercial purposes otherwise than as fuel in any motor vehicle, but excluding any petrol, CNG or LPG used for vehicle races, trials or sporting events.

Schedules of refunds are provided.

Section 187 of the amended Act (1982/10) provides that all vehicles exempt from registration or from payment of registration and annual licence fees are also exempt from payment of MSD or Sales Tax on CNG or LPG.

A3.7 Road User Charges

All powered motor vehicles whose power is not wholely derived from petrol on which motor spirits duty has been imposed, or; on CNG or LPG on which Sales Tax has been imposed; and all motor vehicles (inc. trailers) over 3.5 tonnes gross weight; are required to hold a road user charges distance or time licence (Road User Charges Act 1974).

Time licences apply to vehicles scheduled in the amended Act (1984/5) which are designated "off-road" vehicles for the purposes of the Act. These are listed in Table A3.1.

A3.8 Certificate of Fitness

A certificate of fitness is required by all vehicles used in connection with a passenger service (the carriage of passengers for hire or reward) and all heavy passenger motor vehicles (except those not engaged in the carriage of passengers for hire or reward); rental vehicles; and all goods service vehicles which are heavy motor vehicles (over 2000 kg gross weight). Exceptions to these requirements are: farm vehicles of less than 6500 kg gross weight; motorcars used in a passenger service solely for the carriage of no more than seven school children and not exceeding by more than two the designed adult capacity of the vehicle; trade plates; vehicles being temporarily towed; and others specifically exempted by Order-in-Council.

A3.9 Motor Vehicle Registration and Licensing Records

Paper files, one per vehicle, are held at the Motor Vehicle Registration Centre (MVRC) in Palmerston north. These contain copies of the vehicle registration form (MR2), current annual relicencing form (MR1, MR1C, MR1A) change of ownership (MR13) and change of details forms.

TABLE A3.1
OFF-ROAD VEHICLES (ROAD USER CHARGES DEFINITIONS)

Trailer scrapers
Plant for servicing oil-filled cables
Road rollers
Tractors other than those owned and operated by farmers on their own farms
Post debarkers
Saw bench apparatus
Forestry chippers
Sawing or shearing apparatus for tree cutting
Stone and gravel crushing and screening plant
Asphalt mixing and paving plant
Bulldozers and angle-dozers
Tractor mounted mobile cranes
Front end loaders
Mobile pile drivers
Motor scrapers
Self-propelled water carts that are always unladen on the road
Self-propelled trench diggers and excavators
Self-propelled vehicles that are always unladen on the road and that are designed exclusively for carrying earth or other bulk materials
Mobile cranes excluding mobile vehicle recovery units
Motor graders
Unregistered motor vehicles operated under trade plates
Cable jinkers

Source: Road User Charges Amendment Act (1984/5), Second Schedule

The MVRC keeps three main registers:

- single plate register(s), for vehicles required to carry only a single plate which comprises two wheelers, tractors and trailers.
- general purpose register for the main body of vehicles.
- exempt register for vehicles exempt from licencing fees or motor spirits duty.

Trade (dealers) plates are provided for temporary registration of vehicles before first sale, or at other times when the vehicle is off the road for a protracted period in the hands of motor vehicle traders, wreckers, etc.

Diplomatic plates are carried only by a small number of vehicles, including N.Z. ministerial and foreign diplomatic representatives and are issued from the general register using certain letters.

Annual relicensing may be carried out on single forms (MR1, MR1C) or on multiple relicensing forms (MR1A) to the convenience of the person or organisation concerned. Multiple relicensing forms are physically separate from the MR1 and MR1C individual relicensing forms which latter are kept with vehicle registration, change of ownership and change of details forms as part of the registers.

A3.10 Annual Licence Label

The licence label carried by a vehicle depends upon:

- whether the vehicle is light or heavy
- its form of construction and use
- whether the vehicle is in an exempt category
- its passenger carrying capacity
- whether the driver is a learner

and the details are scheduled in the

TABLE A3.2
ANNUAL LICENCE LABELS

Description	Label
Motor cycles other than provided for under L,R and T labels....	M
Learner motorcycles and mopeds.....	L
Mopeds, light and heavy trailers, and tractors other than L, k and E licences; and bulldozers, top dressing aircraft loaders, weedsprayers and vehicles designed to drive, carry or propel permanently affixed machinery (1).....	R
Heavy trailers other than E licences which require a Certificate of Fitness.....	k
All motor vehicle exempt from the payment of motor spirits duty or registration and annual licence fees, or exempt from registration, or declared exempt by Order-in-Council.....	E
Private motorcars, other than T or E licence and caravans.....	C
Vehicles requiring a Certificate-of-Fitness but not requiring a tranport licence.....	K
Vehicles requiring a transport licence other than motorcycles and mopeds (2).....	T
Motorcycles and mopeds requiring a transport licence (2).....	t
Contract motor vehicles, including qualifying passenger trucks, other than E licences.....	V
All other vehicles not requiring a Certificate of Fitness.....	O

Notes: (1) 45 separate items specified in Schedule A to the Motor Vehicle Registration and Licensing Regulations 1965, Amend 8 (1980)
(2) Prior to 1984 these were K licences

Motor Vehicle Registration and Licensing Regulations 1965. An explanation of each licence type is shown in Table A3.2.

A3.11 Body Style Description

The Post Office frequently requires a body style description on its registration and annual licensing applications. This description is a refinement of the vehicle construction description and is as shown in Table A3.3. The body style description does not necessarily indicate the licence category and has no basis in law.

A3.12 Statistics of Motor Vehicle Licensing

The Post Office publishes summaries quarterly (June, September, December, March). The summaries are national totals and are also available by individual postal district and post office. Relicencing through any particular post office does not necessarily imply that the vehicle is resident at that location. Many larger companies and some central government agencies relicence vehicles through a central office. Also, vehicles based at a rural location may be relicensed at the nearest large centre.

The Post Office licensing statistics are summarised under headings as shown in Table A3.4.

A3.13 Mechanics of updating Post Office Registers and their Currency

Registration of new motor vehicles

TABLE A3.3
POST OFFICE BODY STYLE DESCRIPTIONS AND CODES

Description	Code
CAR	
Saloon	SL
Station Wagon	SW
Convertible	CV
Sports	SP
UTILITY	
VAN (1)	
Light van	LV
Heavy van	HV
TRUCK	
Articulated truck tractive unit	AT
Flat deck truck (no permanent sides and no tipping mechanism)	FT
Other truck	OT
MOTOR CYCLE, MOPED	MC
OMNIBUS, SERVICE COACH (including private and staff buses, minibuses, contract buses etc)	
Light bus	LB
Heavy bus	HB
CARAVAN (self-propelled)	SC
TRACTOR	TA
TRAILER	
Boat trailer	TB
Caravan trailer	TC
Domestic trailer	TD
Commercial flat deck trailer	TF
Commercial other trailer	TO
MOBILE MACHINE (Cranes, fork lifts etc)	MM

Note: (1) Light and heavy in this context does not imply a gross weight limit, only the form of body construction as interpreted by the owner

is effectively limited to public authorities, motor vehicle dealers and Automobile Associations. Once registered, vehicles must hold a current annual licence to legally travel on the road. If the annual licence lapses for a complete licensing year (July to June) the registration may be cancelled. Practically, this means that around September each year vehicle registrations for vehicles which have not held a licence over the preceding licensing year are physically withdrawn from the register. These withdrawn registrations are held for a period by the Post Office and may be reinstated should the vehicle owner apply for a licence at a later date.

Registration plates may also be cancelled if the owner notifies the Post Office of the destruction or removal from New Zealand of the vehicle, in which case the plates are required to be surrendered.

The extent to which Post Office

TABLE A3.4
POST OFFICE LICENSING STATISTICS DEFINITIONS

Post Office Description	Licence	Body Styles	Register	Vehicles Included
CARS	C	SL,SP,CV,SW	G	All light motorcars and heavy motorcars carrying a C licence. Includes school vehicles up to 8 seats and fire brigade cars (Class 12) but excludes contract cars, funeral cars and hearses, all cars used in a passenger service and exempt farmers cars.
RENTAL CARS	T	SL,SP,CV,SW	G	motorcars used in a rental service as defined in para. A3.2
PRIVATE TAXICABS	T	SL,SP,CV,SW	G	As defined in para. A3.2
PUBLIC TAXICABS	T	SL,SP,CV,SW	G	As defined in para. A3.2
LIGHT GOODS SERVICE VEHICLES				
trucks and vans	O	AT,FT,OT,LV,HV,UT	G	] All O licence vehicles
tractors	R	TA	S	] not otherwise
other	O	other body styles	G	] included (see note 1)
HEAVY GOODS SERVICE VEHICLES				
trucks and vans	K	AT,FT,OT,LV,HV,UT	G	] All K licence vehicles
tractors	R	TA	S	] not otherwise
other	K	other body styles	G	] included (see note 2)
TRANSPORT LICENCE GOODS SERVICE VEHICLES				
light trucks/vans	T	AT,FT,OT,LV,HV,UT	G	] Transport licence vehicles
heavy trucks/vans	T	AT,FT,OT,LV,HV,UT	G	] other than TAXI, RENTAL
others	T	various	G	] OMNIBUS and SERVICE COACH
OMNIBUSES	K	LB, HB	G	Omnibuses operating under a continuous passenger service licence on a defined route.
SERVICE COACHES	K	LB, HB	G	Service coaches operating under a continuous passenger service licence on a defined route.
(CONTRACT VEHICLES)	(V)	(various)	G	(All vehicles operating under a continuous passenger service licence or a continuous gooods service licence which allows the carriage of passengers but excluding OMNIBUSES and SERVICE COACHES as described above.) Since 1984 CONTRACT VEHICLES have been included as TRANSPORT LICENCE GOODS SERVICE VEHICLES - OTHERS in the Post Office statistics.

TABLE A3.4 (contd)
POST OFFICE LICENSING STATISTICS DEFINITIONS

Post Office Description	Licence	Body Styles	Register	Vehicles Included
MISCELLANEOUS	R	MM and other	G	All R licence vehicles not otherwise included. Self propelled only: Aerial topdressing vehicles Air compressor plants Angle dozers Asphalt mixing plants Bitumen cauldrons Bulk-loading elevators Bulldozers, wheeled Cable haulers Cable tensioners Carr-all scrapers Concrete mixers Cranes, wheeled Drilling rig apparatus Electric generating plant Electric welding plant Excavators, wheeled Front-end loaders, wheeled Fruit-case making apparatus Glider launching winches Grass mowers, other than exempt Hopper spreaders for lime or fertiliser Horizontal earth drills Log haulers, mobile Mobile cranes, wheeled Mobile emergency radio stations Mobile heart survey units Mobile searchlights Mobile TV stations Multiple driving instruction units Oil well logging vehicles Pavement testing machinery Paving machines, wheeled Pile driving apparatus pipe bending apparatus Plant for servicing oil-filled cables Post de-barking machines Post hole borers, diggers

TABLE A3.4 (contd)
POST OFFICE LICENSING STATISTICS DEFINITIONS

Post Office Description	Licence	Body Styles	Register	Vehicles Included
MOTOR CYCLES	L,M	MC	G	Motor cycles except exempt vehicles.
MOPEDS	L,M	MC	G	Mopeds (power cycles) except exempt.
TRAILERS	K,R	TB,TC,TD,TF,TO	S	Broken into heavy and light. Excludes exempt trailers.
EXEMPT TRAILERS	EA	TB,TC,TD,TF,TO	S	Broken into heavy and light.
EXEMPT VEHICLES	EA	Various	E	Class A vehicles which comprise mainly Off-road and road construction vehicles; racing cars, off-road motorcycles and some mobile cranes.
EXEMPT VEHICLES	EB	Various	E	Aerodrome crash fire tenders Aerodrome runwat sweepers Aero-engine test benches Combine harvesters Corn pickers Crop sprayers Electric substations Farmers cars, trucks and motorcycles Filters for transformer oil Flax pullers Fork lifts Galleys for road and agricultural work Grass mills Grass mowers (cemetery,school,parks local authority) Header harvesters Hedge cutters Hopper spreaders, unladen solely farm. Log haulers, stationary Maize shellers Mobile huts Pea viners Seed cleaners Traction engines Tractors - agricultural, school,cemetery local authority, shipping,top dressing aircraft loaders, rail shunting,sports ground. Weed sprayers, farms, under 3.5 tonnes Windrowers Workshops for road works

TABLE A3.4 (contd)
POST OFFICE LICENSING STATISTICS DEFINITIONS

Post Office Description	Licence	Body Styles	Register	Vehicles Included
MISCELLANEOUS	R	MM and other	G	Pumps
				Road de-slicking vehicles
				Road graders
				Road-marking apparatus
				Road rollers
				Road sweepers and cleaners
				Road water sprinklers
				Rock rooters
				Saw bench apparatus
				Sawing apparatus for tree cutting
				Scoops
				Seed sprayers for soil stabilisation
				Steam cleaning paints
				Stone/gravel crushing or screening plant
				Weed sprayers, farms, over 3.5 tonnes
				Well boring apparatus
				Winches
	O,K			Fire engines

Notes: (1) O licences include:
- Self propelled caravans of any weight
- Fire brigade vehicles other than fire engines, not requiring CoF
- Light hearses
- Hopper spreaders, not otherwise included
- Non-transport licence omnibuses, minibuses not requiring CoF
- School vehicles over 8 seats not requiring CoF
- All trucks, vans and utilities not used under a teansport licence for the carriage of goods or passengers without charge and not subject to CoF.
- Weed sprayers, non-farm

(2) K licences include:
- Ambulances
- Fire brigade vehicles other than fire engines, requiring a CoF.
- Funeral cars
- Heavy hearses
- Non-transport licence omnibuses, minibuses requiring CoF
- School vehicles over 8 seats requiring CoF
- All trucks, vans and utilities not used under a teansport licence for the carriage of goods or passengers without charge and subject to CoF.

returns of vehicles registered and licensed are representative of the on-road population varies by time of year because of the mechanics of the recording and purging process. Annual licence returns are published quarterly and are the sum total of licences taken out for the year in question. At the start of licensing year the vehicle population may be under-represented because of failure to relicense on time. As the year goes on new vehicles are added to the total and those which failed to relicense on time eventually do so. However, vehicles leaving the population may or may not claim a refund on their licence which will tend to exaggerate the recorded figures. At no time is there an exact figure for on-road vehicles, and it is a matter of judgement which quarterly return is not representative. The best advice suggests that March quarter returns are closest to reality.

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APPENDIX 4

VEHICLE POPULATION STATISTICS

A4 VEHICLE POPULATION STATISTICS

A4.1 Introduction

This appendix discusses the manner in which the total vehicle population is disaggregated between sectors of use and by type of vehicle. The Post Office statistics of annual licensing are used as a control total. Also described are other sources of data on the vehicle population as a whole.

A4.2 Vehicle Totals by Vehicle Type

The Post Office statistics of annual vehicle relicensing are published quarterly. The March quarter is believed to give the closest estimate to the number of vehicles actually on the road at the time. Consequently the March return is taken to be representative of the calendar year.

The classification of these statistics into vehicle type is discussed in Appendix A3. The categories are principally by licence label. A breakdown for recent years is given in Table A4.1.

Motorcycles and powercycles were redefined between 1975 and 1976, hence the increase in one and reduction in the other. The term "power cycle" was recently changed to "moped".

"Cars" are all vehicles carrying a C licence label, but include a small proportion of other body styles.

"Taxicabs" are the total of public taxicabs and private taxicabs.

"Rental Cars" are distinguished in the Post Office statistics. Rental trucks, however, are not and are included in "goods service vehicles".

TABLE A4.1
POST OFFICE RELICENSING STATISTICS - MARCH QUARTERS

YEAR	CARS	RENTAL CARS	PRIVATE TAXIS	LIGHT GSVs				HEAVY GSVs				TOTAL GOODS SERVICE VEHICLES
				Trucks & vans	Tractor	Other	Total	Trucks vans	Tractors	Other	Total	
1985	1,481,822	10,117	374	206,287	6,963	3,583	213,575	76,570	1,893	3,676	82,139	295,714
1984	1,432,779	7,395	399	203,799	6,675	3,469	213,943	74,185	1,786	4,119	80,090	294,033
1983	1,394,109	7,133	223	197,312	6,883	3,004	207,199	75,753	1,496	3,580	80,829	288,028
1982	1,360,477	6,247	265	190,440	7,021	2,881	200,342	76,372	1,238	3,283	80,893	281,235
1981	1,319,305	6,127	174	176,653	7,478	2,696	186,827	74,060	999	2,662	77,721	264,548
1980	1,283,661	5,945	119	166,379	7,531	2,782	176,692	73,262	676	2,934	76,872	253,564
1979	1,244,751	5,484	114	163,864	7,049	2,555	173,468	71,016	510	2,898	74,424	247,892
1978	1,215,638	5,533	84	151,938	6,934	2,529	161,401	71,648	642	3,000	75,290	236,691
1977	1,200,003	5,899	101	146,238	6,593	3,399	156,230	72,669	232	3,071	75,972	232,202
1976	1,172,000	5,425	130	129,193	5,219	3,033	137,446	70,720	662	2,326	73,708	211,154
1975	1,129,611	5,279	132	124,760	4,578	2,613	131,951	71,467	987	2,371	74,825	206,776
1974	1,078,795	5,038	99	123,019	4,767	2,446	130,232	67,158	583	2,153	69,895	200,127
1973	1,020,778	4,197	129	116,768	4,122	2,315	123,205	67,935	744	2,770	71,449	194,654
1972	955,446	4,007	129	112,347	3,691	1,777	117,815	69,271	983	2,556	72,810	190,625
1971	908,253	3,661	159	105,868	3,179	1,529	110,577	67,115	791	3,279	71,185	181,762
1970	861,958	3,222	157	99,593	2,973	1,118	103,684	64,948	708	2,137	67,793	171,477

YEAR	CONTRACT VEHICLES	OMNIBUSES	PUBLIC TAXIS	SERVICE COACHES	MISCELL-ANEOUS	MOTOR CYCLES	POWER CYCLES	MOTOR & POWER CYCLES	TOTAL ON-ROAD POWERED	ON-ROAD TRAILERS
1985	839	3,169	2,582	1,483	11,270	137,442	1,441	138,883	2,085,136	384,810
1984	713	3,029	2,620	1,105	11,424	141,156	1,379	142,535	2,038,567	380,082
1983	874	2,730	2,669	1,050	11,352	143,894	1,479	145,373	1,998,914	375,653
1982	1,331	2,452	2,852	973	11,384	144,327	1,591	145,918	1,959,052	378,556
1981	1,282	2,575	2,996	953	10,898	136,722	1,748	138,470	1,885,798	367,439
1980	1,396	2,556	3,015	841	11,705	123,071	2,001	125,072	1,812,946	361,720
1979	1,268	2,659	2,951	757	12,376	104,570	1,890	106,460	1,731,172	353,658
1978	1,280	2,622	2,987	684		103,712	2,103	105,815	1,677,149	337,832
1977	1,250	2,674	3,084	594		104,147	2,879	107,026	1,659,859	334,642
1976	1,192	2,660	3,082	563		98,833	4,207	103,040	1,602,286	307,489
1975	1,205	2,617	3,113	513		66,815	26,841	93,656	1,536,558	283,710
1974	1,109	2,539	3,046	515		60,493	26,655	87,148	1,465,564	258,329
1973	1,117	2,564	2,993	536		47,476	24,950	72,426	1,371,820	224,819
1972	1,139	2,613	2,937	489		39,326	23,614	62,940	1,283,265	208,683
1971	1,182	2,643	2,918	470		32,099	20,974	53,073	1,207,194	195,609
1970	1,594	2,688	2,891	455		29,176	18,826	48,002	1,140,446	184,359

"Contract Vehicles" include passenger trucks and other vehicles operating under a written contract for hire and not as part of a passenger transport service.

"Omnibuses" and "Service Coaches" are buses of those forms of construction used in a passenger transport service other than contract vehicles.

"Goods Service Vehicles", refer to all O and K licence vehicles not included under other licence label categories and include:

- rental vehicles other than cars
- buses other than passenger service or contract vehicles
- goods vehicles
- other body styles not included in other licence label categories

The Post Office statistics describe goods service vehicles as: trucks and vans; tractors (on-road); and other body styles, and also differentiate between light and heavy vehicles. Articulated driving units of semitrailer combinations are classed as trucks.

Other buses and rental trucks have been deducted from the "Other GSV's, Heavy" and "Trucks and Vans" categories respectively. Rental trucks have been assumed to be proportioned into light and heavy categories as for trucks as a whole.

The "Miscellaneous" category comprises R registered vehicles other than powercycles and trailers.

The exempt categories Class A and Class B are off-road vehicles exempt from payment of motor spirits duty or annual relicensing fees. The classification of these vehicles changed between 1975 and 1978 with the introduction of Road User Charges as discussed in Appendix A3.

The Post Office relicensing statistics have been modified to better define the vehicle population in terms of general body type. The modifications are shown in Table A4.2.

A4.3 N.Z. Vehicle Fleet Composition Study, (BCHF Ltd) December 1979

A 1% sample survey of the general register of motor vehicles carried out at the end of 1978 provides a cross correlation between licence label, heavy/light vehicles, fuel type and body style and also shows the holdings by transport operators, car dealers and wreckers, government, company and private owners. The private owner category is imprecise, as it contains business vehicles registered under a person's name rather than a company but which may still be a business vehicle.

The most important statistics from this report are shown in Table A4.3.

It will be noted that 2% of the survey sample were held by car dealers and wreckers. This percentage is assumed to remain constant with time and to extend to two wheel vehicles also. The car dealers and wreckers are classified in NZSIC 6281, part of retail trade and their holdings are separately

TABLE A4.2
MODIFICATIONS TO POST OFFICE LICENSING STATISTICS

Modifed Total	Relationship to P.O. Figures
Cars.....	Cars + Private Taxi + Public Taxi + Rental Car + some Contract Vehicles
Light Commercial Vehicles (LCVs)...	Light Trucks and Vans + Light Other Goods Service Vehicles
Heavy Commercial Vehicles (HCVs)...	Heavy Trucks and Vans + Heavy Other Goods Service Vehicles - Ancillary Buses (see App A10)
Buses.....	Omnibuses + Service Coaches + most Contract Vehicles + Ancillary Buses (see App A10)
Miscellaneous Vehicles.....	Miscellaneous Vehicles + Light Tractors + Heavy Tractors
Motorcycles.....	Motorcyles + Mopeds (Power Cycles)

TABLE A4.3 1978 SAMPLE SURVEY OF GENERAL REGISTER OF MOTOR VEHICLES - Percentages of Vehicle Type Totals, Sample Data

LICENCE LABEL	Cars (C Licence)									K Licence (Licensed Transport and Heavy Vehicles)								
LIGHT/HEAVY	Light			Heavy			Total			Light			Heavy			Total		
FUEL TYPE	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total
BODY STYLE																		
Saloon	88.40	0.00	88.40	0.13	0.00	0.13	88.53	0.00	88.53	0.25	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.25
Station Wagon	9.35	0.00	9.35	NA	0.00	NA	9.37	0.00	9.37	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA
Sports	0.94	0.00	0.94	0.00	0.00	0.00	0.94	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Convertible	0.25	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAR TYPES	98.93	0.00	98.93	0.16	0.00	0.16	99.09	0.00	99.09	0.28	0.00	0.28	NA	0.00	NA	0.28	0.00	0.28
Light Van	2.56	0.00	2.56	0.00	0.00	0.00	2.56	0.00	2.56	0.47	0.00	0.47	NA	NA	NA	0.68	NA	0.73
Utility	1.54	0.00	1.54	0.00	0.00	0.00	1.54	0.00	1.54	0.00	0.00	0.00	NA	0.00	NA	NA	0.00	NA
Heavy Van	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	NA	0.00	NA	0.68	NA	0.98	0.81	NA	1.11
Articulated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	NA	1.15	1.28	NA	1.15	1.37
Flat Deck	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	0.85	NA	0.94	4.66	1.97	6.62	5.51	2.05	7.56
Other Truck	0.64	0.00	0.64	0.00	0.00	0.00	0.64	0.00	0.64	1.15	NA	1.32	8.21	6.67	14.87	9.36	6.84	16.20
COMMERCIAL TYPE	5.17	0.00	5.17	NA	0.00	NA	5.21	0.00	5.21	2.69	NA	2.95	13.97	10.13	24.10	16.67	10.38	27.05
Light Bus	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	20.00	0.00	20.00	NA	0.00	NA	21.82	0.00	21.82
Heavy Bus	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	NA	0.00	NA	32.73	21.82	54.55	36.36	21.82	58.18
BUS TYPES	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	23.64	0.00	23.64	34.55	21.82	56.36	58.18	21.82	80.00
Caravan	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	NA	NA
Tractor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	NA	0.00	NA
Machine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	7.87	11.81	NA	8.66	12.60
OTHER POWERED	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	8.66	14.17	NA	9.45	15.75
TOTAL	83.31	0.00	83.31	0.15	0.00	0.15	83.45	0.00	83.45	0.74	NA	0.78	2.33	1.71	4.05	3.07	1.76	4.83
	100.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	100.0	94.1	5.9	100.0	57.7	42.3	100.0	63.6	36.4	100.0

(Note - NA indicates sample frequency less than 10 vehicles, implies less than 1000 in fleet)

Source : N.Z. Fleet Composition Study, Beca Carter Holling and Ferner Ltd, for Liquid Fuels Trust Board

TABLE A4.3 (Contd) 1978 SAMPLE SURVEY OF GENERAL REGISTER OF MOTOR VEHICLES - Percentages of Vehicle Type Totals, Sample Data

LICENCE LABEL	O Licence (Light Commercial Vehicles)									R Licence (Miscellaneous On-Road Vehicles)								
LIGHT/HEAVY	Light			Heavy			Total			Light			Heavy			Total		
FUEL TYPE	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total
BODY STYLE																		
Saloon	0.14	0.00	0.14	NA	NA	NA	0.15	NA	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Station Wagon	0.44	0.00	0.44	0.00	0.00	0.00	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sports	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Convertible	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAR TYPES	0.59	0.00	0.59	NA	NA	NA	0.60	NA	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Van	29.96	0.00	29.96	1.84	0.00	1.84	31.79	0.00	31.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utility	14.74	NA	14.83	0.60	NA	0.64	15.34	NA	15.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Van	NA	0.00	NA	NA	0.00	NA	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Articulated	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	NA	NA	0.00	NA	NA
Flat Deck	6.92	NA	7.01	2.05	NA	2.22	8.97	NA	9.23	0.00	0.00	0.00	0.00	NA	NA	0.00	NA	NA
Other Truck	6.84	NA	6.92	2.91	NA	3.21	9.74	NA	10.13	NA	0.00	NA	NA	NA	NA	NA	NA	0.43
COMMERCIAL TYPE	58.80	NA	59.06	7.61	0.51	8.12	66.41	0.77	67.18	NA	0.00	NA	NA	NA	0.43	NA	NA	0.51
Light Bus	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Bus	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BUS TYPES	NA	0.00	NA	NA	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Caravan	10.24	0.00	10.24	NA	NA	NA	15.75	NA	17.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	0.00	7.87	7.87	NA	9.45	11.02
Machine	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.87	8.66	30.71	39.37	13.39	33.86	47.24
OTHER POWERED	11.81	0.00	11.81	NA	NA	9.45	18.90	NA	21.26	NA	NA	11.02	8.66	38.58	47.24	14.96	43.31	58.27
TOTAL	9.69	NA	9.73	1.25	0.11	1.35	10.94	0.15	11.09	0.07	NA	0.11	0.11	0.36	0.46	0.17	0.40	0.57
	99.39	0.41	100.00	92.20	7.80	100.00	98.69	1.31	100.00	62.50	37.50	100.00	22.86	77.14	100.00	30.23	69.77	100.00

(Note - NA indicates sample frequency less than 10 vehicles, implies less than 1000 in fleet)

Source : N.Z. Fleet Composition Study, Beca Carter Holling and Ferner Ltd, for Liquid Fuels Trust Board

TABLE A4.3 (Contd) 1978 SAMPLE SURVEY OF GENERAL REGISTER OF MOTOR VEHICLES - Percentages of Vehicle Type Totals, Sample Data

LICENCE LABEL	V Licence (Contract Vehicles)									TOTAL								
LIGHT/HEAVY	Light			Heavy			Total			Light			Heavy			Total		
FUEL TYPE	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Total
BODY STYLE																		
Saloon	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	88.80	0.00	88.80	0.14	NA	0.15	88.94	NA	88.95
Station Wagon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.82	0.00	9.82	NA	0.00	NA	9.86	0.00	9.86
Sports	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.00	0.94	0.00	0.00	0.00	0.94	0.00	0.94
Convertible	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.25
CAR TYPES	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	99.82	0.00	99.82	0.17	NA	0.18	99.99	NA	100.00
Light Van	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	33.03	0.00	33.03	2.05	NA	2.09	35.09	NA	35.13
Utility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.28	NA	16.37	0.68	NA	0.73	16.97	NA	17.09
Heavy Van	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.51	0.85	NA	1.15	1.37	NA	1.67
Articulated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	NA	1.20	1.37	NA	1.20	1.50
Flat Deck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.12	NA	8.29	6.75	2.18	8.93	14.87	2.35	17.22
Other Truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.72	NA	8.97	11.32	7.09	18.42	20.04	7.35	27.39
COMMERCIAL TYPE	NA	0.00	NA	0.00	0.00	0.00	NA	0.00	NA	66.79	0.51	67.31	21.84	10.85	32.69	88.63	11.37	100.00
Light Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.45	0.00	25.45	NA	0.00	NA	29.09	0.00	29.09
Heavy Bus	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	0.00	NA	36.36	25.45	61.82	45.45	25.45	70.91
BUS TYPES	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	34.55	0.00	34.55	40.00	25.45	65.45	74.55	25.45	100.00
Caravan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.39	0.00	13.39	NA	NA	9.45	20.47	NA	22.83
Tractor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	NA	7.87	8.66	NA	9.45	11.81
Machine	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	10.24	14.96	40.16	55.12	21.26	44.09	65.35
OTHER POWERED	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	21.26	NA	26.77	22.83	50.39	73.23	44.09	55.91	100.00
TOTAL	NA	0.00	NA	NA	NA	NA	NA	NA	NA	93.83	0.13	93.95	3.85	2.20	6.05	97.68	2.32	100.00
	100.00	0.00	100.00	50.00	50.00	100.00	66.67	33.33	100.00	99.87	0.13	100.00	63.69	36.31	100.00	97.68	2.32	100.00

(Note - NA indicates sample frequency less than 10 vehicles, implies less than 1000 in fleet)

Source : N.Z. Fleet Composition Study, Beca Carter Holling and Ferner Ltd, for Liquid Fuels Trust Board

TABLE A4.4
CENSUS OF POPULATION AND DWELLINGS 1981
CARS AND VANS IN THE CARE OF HOUSEHOLD MEMBERS

NUMBERS OF HOUSEHOLDS:

Urban Area Type	PRIVATE 0	1	2	3	4+	Unspec.	Total
Main	105.1	363.3	139.9	29.7	9.2	50.0	697.2
Secondary	8.5	39.5	14.3	2.8	0.8	4.1	70
Other	10.6	51.1	17.2	3.2	0.9	6.8	89.8
Rural	8.8	75.7	39.8	9.9	3.7	8.2	146.1
Total	133.0	529.6	211.2	45.6	14.6	69.1	1003.1

Urban Area Type	BUSINESS 0	1	2	3+	Unspec.	Total
Main	283.7	81.2	10.3	2.8	319.2	697.2
Secondary	27.9	7.2	1.2	0.4	33.4	70.1
Other	30.7	8.5	1.5	0.5	48.6	89.8
Rural	42.0	14.5	3.9	1.5	84.2	146.1
Total	384.3	111.4	16.9	5.2	485.4	1003.2

Urban Area Type	PRIVATE AND BUSINESS = ALL VEHICLES 0	1	2	3	4	5	Unspec.	TOTAL HOUSE-HOLDS
Main	94.5	325.7	180.8	42.2	11.1	4.6	38.2	697.1
Secondary	7.5	35.8	17.9	4.1	1.1	0.5	3.1	70.0
Other	9.5	47.0	21.4	4.8	1.2	0.6	5.3	89.8
Rural	6.8	68.0	46.4	13.3	4.1	2.0	5.3	145.9
Total	118.3	476.5	266.5	64.4	17.5	7.7	51.9	1002.8

Note: The wording of the Census question was:

* Specify the number of vehicles, caravans and boats that are in the care of household members (i.e. persons in this dwelling on Census night) and available for use.
* Include vehicles, caravans and boats owned by household members, no matter where they are being kept on Census night, unless they are in the care of someone else on that night.
* Include vehciles, caravans and boats in the care of household members and which have been hired (e.g. rental car), borrowed (e.g. company car, business van, borrowed caravan) or leased by them for private or business use.

identified in the industry breakdown of the fleet.

Table A4.3 also shows the correlation between body style, fuel type and light/heavy vehicles. For cars, defined as C-licence vehicles, 1.0% were non-car body styles, but this is compensated by 0.6% of car body styles classed as O-licence commercial vehicles.

Other features from this survey are discussed in the appendices on Agricultural and Off-Road vehicles, Buses and Heavy and Light Commercial vehicles.

A4.4 Census of Population and Dwellings, 1981

The most recent census questioned households on their vehicle holdings and the results are reproduced in Table A4.4. The information covers private and business cars available for use; motorcycles, powercycles, and bicycles; caravans (including camper trailers); and pleasure boats. The exact wording of the questionnaire is also important and is reproduced.

The census frequency tables of

TABLE A4.5
WANGANUI COMPUTER STATISTICS ANALYSIS - APRIL 1984

BODY STYLE	NUMBER OF VEHICLES (Gas and Unknown redistributed)							
	Petrol	Diesel	CNG	LPG	Electric	Other	Trailers	Total
CAR TYPES:								
Saloon	1,377,814	561	24,059	4,425	338	5	0	1,407,203
Station Wagon	165,848	156	3,776	362	26	1	0	170,169
Sports	20,589	3	75	8	6	0	0	20,680
Convertible	4,352	4	9	6	0	1	0	4,372
Sub-Total	1,568,602	725	27,922	4,799	370	7	0	1,602,424
LIGHT COMMERCIAL TYPES:								
Light Van	117,855	1,295	7,711	716	45	3	0	127,624
Utility	58,479	1,888	3,203	781	33	0	0	64,385
Sub-Total	176,334	3,183	10,915	1,497	78	3	0	192,009
HEAVY COMMERCIAL TYPES:								
Heavy Van	6,310	1,221	969	100	15	1	0	8,615
Articulated	2,797	3,340	28	10	3	0	0	6,178
Flat Deck	49,229	12,306	921	336	31	4	0	62,827
Sub-Total	58,339	16,863	1,920	444	49	5	0	77,620
GENERAL COMMERCIAL TYPE:								
Other truck	64,153	21,636	1,703	589	40	8	0	88,129
BUSES:								
Light Bus	891	31	104	6	0	0	0	1,032
Heavy Bus	6,095	2,225	150	62	5	125	0	8,662
Sub-Total	6,985	2,258	254	67	5	125	0	9,694
OTHER POWERED TYPES:								
Motorcycle	310,979	41	9	0	5	16	0	311,050
Caravan	3,503	355	27	14	1	0	0	3,900
Tractor	26,423	46,316	10	5	9	5	0	72,768
Machine	9,567	8,071	71	525	277	346	0	18,857
Other	126,531	8,408	574	167	126	69	0	135,875
Sub-Total	474,944	65,413	623	618	403	442	0	542,443
TOTAL - POWERED	2,349,357	110,077	43,336	8,014	945	591	0	2,512,319
UNPOWERED - TRAILERS:								
Domestic	0	0	0	0	0	0	267,111	267,111
Boat	0	0	0	0	0	0	65,584	65,584
Caravan	0	0	0	0	0	0	80,159	80,159
Comm.- Flat	0	0	0	0	0	0	13,302	13,302
Comm.- Other	0	0	0	0	0	0	42,597	42,597
TH	0	0	0	0	0	0	573	573
TL	0	0	0	0	0	0	13,381	13,381
TOTAL-UNPOWERED	0	0	0	0	0	0	482,707	482,707

TABLE A4.5 (Contd)
WANGANUI COMPUTER STATISTICS ANALYSIS - APRIL 1984

BODY STYLE	PERCENTAGE OF VEHICLES (Gas and Unknown redistributed)							
	Petrol	Diesel	CNG	LPG	Electric	Other	Trailers	Total
CAR TYPES:								
Saloon	85.98	0.04	1.50	0.28	0.02	0.00	0.00	87.82
Station Wagon	10.35	0.01	0.24	0.02	0.00	0.00	0.00	10.62
Sports	1.28	0.00	0.00	0.00	0.00	0.00	0.00	1.29
Convertible	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.27
Sub-Total	97.89	0.05	1.74	0.30	0.02	0.00	0.00	100.00
LIGHT COMMERCIAL TYPES:								
Light Van	61.38	0.67	4.02	0.37	0.02	0.00	0.00	66.47
Utility	30.46	0.98	1.67	0.41	0.02	0.00	0.00	33.53
Sub-Total	91.84	1.66	5.68	0.78	0.04	0.00	0.00	100.00
HEAVY COMMERCIAL TYPES:								
Heavy Van	8.13	1.57	1.25	0.13	0.02	0.00	0.00	11.10
Articulated	3.60	4.30	0.04	0.01	0.00	0.00	0.00	7.96
Flat Deck	63.42	15.85	1.19	0.43	0.04	0.01	0.00	80.94
Sub-Total	75.16	21.72	2.47	0.57	0.06	0.01	0.00	100.00
GENERAL COMMERCIAL TYPE:								
Other truck	72.79	24.55	1.93	0.67	0.05	0.01	0.00	100.00
BUSES:								
Light Bus	9.19	0.32	1.07	0.06	0.00	0.00	0.00	10.65
Heavy Bus	62.87	22.96	1.55	0.64	0.05	1.29	0.00	89.35
Sub-Total	72.05	23.29	2.62	0.69	0.05	1.29	0.00	100.00
OTHER POWERED TYPES:								
Motorcycle	57.33	0.01	0.00	0.00	0.00	0.00	0.00	57.34
Caravan	0.65	0.07	0.01	0.00	0.00	0.00	0.00	0.72
Tractor	4.87	8.54	0.00	0.00	0.00	0.00	0.00	13.41
Machine	1.76	1.49	0.01	0.10	0.05	0.06	0.00	3.48
Other	23.33	1.55	0.11	0.03	0.02	0.01	0.00	25.05
Sub-Total	87.56	12.06	0.11	0.11	0.07	0.08	0.00	100.00
TOTAL - POWERED	93.51	4.38	1.72	0.32	0.04	0.02	0.00	100.00
UNPOWERED - TRAILERS:								
Domestic	0.00	0.00	0.00	0.00	0.00	0.00	55.34	55.34
Boat	0.00	0.00	0.00	0.00	0.00	0.00	13.59	13.59
Caravan	0.00	0.00	0.00	0.00	0.00	0.00	16.61	16.61
Comm.- Flat	0.00	0.00	0.00	0.00	0.00	0.00	2.76	2.76
Comm.- Other	0.00	0.00	0.00	0.00	0.00	0.00	8.82	8.82
TH	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12
TL	0.00	0.00	0.00	0.00	0.00	0.00	2.77	2.77
TOTAL-UNPOWERED	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

households (Vol. 9, Nos 22, 23, 24) have been converted to percentage tables and non-responses to questions treated either as indicating nil vehicles or re-distributed in proportion to responses received.

A4.5 Wanganui Computer

From time to time, compilations of vehicle statistics have been obtained from the Wanganui Computer. Table A4.5 shows the most recent, being a cross tabulation of vehicles on record by body style against motive power.

A4.6 Census of Transport, Storage and Communications

The 1980 Census of Transport recorded some detail on the holdings of vehicles by subsector classifications within Transport. These data are summarised in Table A4.6.

TABLE A4.6
CENSUS OF TRANSPORT,STORAGE AND COMMUNICATIONS 1979/80 - VEHICLE HOLDINGS BY TRANSPORT INDUSTRY SUBSECTORS

NZSIC Category	Description	Cars	Light CVs			Heavy CVs			Buses				Other Vehicles			Trailers
			Petrol	Diesel	Total	Petrol	Diesel	Total	Petrol	Diesel	Other	Total	Petrol	Diesel	Total	
7111	Rail Transport	100				10	1,000	1,010								250
71121	Urban Passenger Bus	48	8	1	9	2	1	3	573	852	29	1,454	11		11	10
71122	Route Passenger Bus	136	9		9	10		10	436	412	2	850				2
71132	School Bus Contractors	106	22		22	19	9	28	590	362		952	14		14	9
71133	Bus Tour Operators	126	3		3	2		2	110	315		425				3
7112/3	Bus Operators	416	42	1	43	33	10	43	1,709	1,941	31	3,681	25		25	24
71131	Taxi Operators	2,287	5		5	2	1	3	2	1		3	3		3	4
71139	Other Road Passenger	26	2		2	1	1	2	9	10		19				
71141	Logging Haulage	71	32		32	45	189	234					11	4	15	230
71142	Stock Haulage	132	59	58	117	78	884	962					8	21	29	934
71143	Refrigerated Haulage	54	6	4	10	41	122	163					8	67	75	249
71144	Heavy Haulage	230	57	46	103	139	404	543					352	80	432	659
71145	Bulk Haulage	394	117	44	161	336	1,286	1,622	3	2		5	26	192	218	997
71146	Furniture Removal	74	17	17	34	54	134	188					4	2	6	44
71147	Route Haulage	50	9		9	98	197	295					3	8	11	155
71148	General Carriers	1,465	755	223	978	2,229	5,781	8,010	23	10		33	177	350	527	4,142
71149	Other Road Freight	320	278		278	117	64	181	13			13	3	1	4	66
7114	Road Freight	2,790	1,330	392	1,722	3,137	9,061	12,198	39	12		51	592	725	1,317	7,476
71141	Car & Truck Rental	4,912	723	10	733	125	18	143	21			21	87	44	131	37
71162	Vehicle Parking Fac.	1											1		1	
71169	Support to Land Trans.	120	32	19	51	25	9	34					1	7	8	10
71210	Sea Transport	42	2		2											5
71220	Inland Water Transport	13	7		7	6	4	10		4		4				11
71231	Harbour Boards	12	30		30	17	1	18								
71233	Stevedoring	80	26		26	8		8					24	4	28	28
71239	Support to Water Trans	15														2
712	Water Transport	162	65		65	31	5	36		4		4	24	4	28	46
71310	Air Transport Carriers	128	35		35	11		11								2
71321	Aero Clubs		2		2											
71322	Airport Operations	34				51		51						40	40	
713	Air Transport	162	37		37	62		62						40	40	2
71911	Travel Agents	151							4			4	65		65	2
71912	Freight Agents	678	20		20	95	49	144					19	3	22	137
71919	Other Support to Trans	13				1		1					3		3	1
719	Support to Transport	842	20		20	96	49	145	4			4	87	3	90	140
71920	Storage & Warehousing	16	4		4	7	4	11					29	6	35	2
72001	Post Office	1,977	3,552	1	3,553	1,049		1,049								628
72009	Other Communications	62	1		1	1		1								1
7	TOTAL	13,873	5,813	423	6,236	4,579	10,158	14,737	1,784	1,968	31	3,783	849	829	1,678	8,620

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APPENDIX 5

MISCELLANEOUS AND OFF-ROAD VEHICLES, PRINCIPALLY FARM VEHICLES

A5 MISCELLANEOUS AND OFF-ROAD VEHICLES, PRINCIPALLY FARM VEHICLES

This appendix draws together the results of surveys and other data available on fuel use in farming. This is a particularly difficult sector to summarise owing to the limited scope of surveys, and ambiguities in definition in official returns and other data sources.

A5.1 Definition of Farms and Relation to Other Rural Industries

The reader is referred to McChesney (1891). The Agricultural Statistics identify 71,505 farms throughout New Zealand as at 30 June 1980 including livestock, cropping, horticulture, animal breeding, hops and tobacco, apiarists, plantations and idle land. Once plantations, unoccupied land and small holdings run as part-time ventures are discounted, McChesney estimates 48,000 full time occupied holdings remain, of which the majority are meat, wool and dairying enterprises.

A comparison of the 1980 farm statistics with following years is given in Table A5.1.

Because farm work and servicing involves other parties than the owner or tenant of the land (agricultural and cartage contractors, stock and station

TABLE A5.1
NUMBERS OF FARMS

Year Ending June	Number of Farms		
	N.Island	S.Island	All
1983	51,667	24,078	75,745
1980	47,978	23,527	71,505
1977			0
1974			0

TABLE A5.2
MOBILE FARM MACHINERY

Year Ending June	Farm Trucks			Farm Bikes	Spreaders	Balers	Sprayers	Harvester	Chain Saws
	Petrol	Diesel	All						
1985	27,193	10,298	37,491	45,297	19,163	11,900	26,687	8,402	71,225
1984	27,819	9,219	37,038	43,906	19,330	12,217	27,170	8,578	68,537
1983	28,446	8,139	36,585	42,516	19,498	12,535	27,654	8,753	65,849
1982	29,073	7,059	36,132	41,126	19,666	12,853	28,138	8,928	63,161
1981	29,699	5,980	35,679	39,735	19,833	13,170	28,621	9,104	60,473
1980	30,326	4,900	35,226	38,345	20,001	13,488	29,105	9,279	57,785
1979	29,916	4,834	34,750	36,330	20,169	14,915	29,589	9,276	55,097
1978	29,506	4,768	34,274	34,314	20,336	16,343	30,072	9,273	52,409
1977	29,097	4,701	33,798	32,299	20,504	17,770	30,556	9,270	49,721
1976	28,858	4,663	33,521	30,284	20,672	19,197	31,040	9,267	47,033
1975	28,620	4,624	33,244	28,268	20,839	20,625	31,523	9,264	44,345
1974	28,381	4,586	32,967	26,253	21,007	22,052	32,007	9,261	41,657

Year Ending June	Wheeled Tractors			Crawler Tractors			Total Tractors		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
1985	16,740	59,481	76,221	34	15,388	15,421	16,773	74,869	91,642
1984	17,933	59,336	77,269	703	13,811	14,515	18,637	73,147	91,784
1983	19,127	59,190	78,317	1,373	12,235	13,608	20,500	71,425	91,925
1982	20,321	59,044	79,365	2,043	10,659	12,701	22,363	69,703	92,066
1981	21,514	58,899	80,413	2,712	9,082	11,795	24,227	67,981	92,208
1980	22,708	58,753	81,461	3,382	7,506	10,888	26,090	66,259	92,349
1979	23,761	56,856	80,617	3,558	7,442	11,000	27,319	64,298	91,617
1978	24,813	54,960	79,773	3,734	7,377	11,111	28,547	62,337	90,884
1977	25,866	53,063	78,929	3,910	7,313	11,223	29,776	60,376	90,152
1976	27,720	52,778	80,498	3,844	7,522	11,366	31,564	60,300	91,864
1975	29,574	52,494	82,068	3,779	7,730	11,509	33,353	60,224	93,577
1974	31,428	52,209	83,637	3,713	7,939	11,652	35,141	60,148	95,289

Notes: (1) Figures for trienniel census years 1983,1980,1977,1974 taken from Agricultural Census. Intermediate years are interpolated.
(2) Motive power breakdown for farm trucks available only in the 1983 Census. 1980 figures adapted from consultants analysis, earlier years pro-rata as for 1980. Other years interpolated using 1980 and 1983 base.
(3) All data poast 1983 extrapolated from 1980-1983 bas
(4) Chainsaws, spreaders, sprayers not surveyed in 1983, extrapolated from 1977

agents, veterinary services etc.) there has to be a distinction between on-and off-farm ownership and use of vehicles, and delivery and use of fuel.

Rural cartage in this report is included in licensed truck transport. Farmers trucks used for cartage off-farm (rather than between farm blocks) are included in ancillary truck transport under NZSIC Category 11.

There is also a difficulty in distinguishing between vehicle use to support the farm as a business and vehicle use associated with the households on the farm.

McChesney (1980) notes that car ownership attributable to permanent farm based workers amounts to 65% of that owned by the total workforce employed in "Agriculture and Hunting". Vehicles owned by non-resident farm workers and agricultural service workers are included in the remaining 35%.

A5.2 Vehicle Holding by Farms

The Agricultural Statistics indicate the holdings of farm vehicles. These are intended to be vehicles used directly in farm operations and therefore exclude cars. The definition of "farm trucks" is ambiguous and may be taken by respondents to the survey to be:

either (a) trucks used exclusively on the farm - ie unregistered and exempt vehicles

or (b) as above but include heavy trucks licensed for on-road use

or (c) as above but include some light commercial vehicles licensed for on-road use.

This analysis assumes that "farm trucks" is best described by (c) above.

The holdings of vehicles and mobile machinery which may be registered (i.e. capable of moving on the road and provided for in Post Office registration procedures) from the Agricultural Statistics is shown in Table A5.2

A sample of vehicles licensed on 81 farms taken from Post Office multiple relicensing MR1A records is shown in Table A5.3. There is no check on the size range or type of farms included except that they are most likely to be large livestock farms. The proportion of exempt to non-exempt farm trucks is 40:60. Assuming that few farm trucks are unregistered (i.e. never used on public roads) then the total of unregistered and exempt farm vehicles is as shown in Table A5.4.

TABLE A5.3
HOLDINGS OF VEHICLES ON FARMS

Vehicle Type		Vehicles/Farm		
		N.Island	S.Island	N.Z.
Cars		1.3	1.4	1.38
Light Commercial Vehicles		1.1	1.1	1.10
Trucks	- petrol	0.3	0.5	0.40
	- diesel	0.9	0.5	0.63
On-Road Vehicles		3.6	3.5	3.51
Exempt Trucks	- petrol	0.2	0.7	0.49
	- diesel	0.1	0.3	0.19
Tractors	- petrol	0.5	0.7	0.63
	- diesel	2.5	2.0	2.16
Exempt (Off-Road) Vehicles		3.3	3.7	3.47
Trailers	- light	1.9	2.2	2.09
	- heavy	1.0	0.7	0.79
Other (bikes, machines)		1.3	1.7	1.40
Number of farms		30	51	81

Source: sample of MR1A multiple relicensing records covering 81 farms, probably larger holdings and mainly farming, 1981/82

TABLE A5.4
ESTIMATED HOLDINGS OF VEHICLES ON FARMS (FOR 1981)

Vehicle Type		Petrol	Diesel	Total
ON-ROAD VEHICLES:				
Household	- cars	66,000		66,000
	- light CVs	17,000	1,000	18,000
Farm Operation	- light CVs	23,100	1,200	24,300
	- trucks	3,300	5,000	8,300
Sub-Total, On-Road Vehicle		109,400	7,200	116,600
OFF-ROAD (EXEMPT) VEHICLES:				
Heavy Trucks		3,900	1,500	5,400
Wheeled Tractors		11,400	29,400	40,800
Farm Bikes		19,000		19,000
Sub-Total, Exempt Vehicles		34,300	30,900	65,200
UNREGISTERED VEHICLES				
Wheeled Tractors		11,400	29,400	40,800
Crawler Tractors		3,400	7,500	10,900
Harvesters			4,300	4,300
Farm Bikes		19,000		19,000
Sub-Total, Unregistered		33,800	41,200	75,000
TOTAL, ALL VEHICLES		177,500	79,300	256,800

Source: see text

This may be compared with Class B exempt vehicle licences which were 74,639 in March 1980, implying that approximately 50% of farm vehicles are unregistered. Of these, crawler tractors and header harvesters are assumed to be mostly unregistered. Assuming all are in this category leaves approximately 59,300 unregistered wheeled tractors and farm bikes in 1980.

On the basis of surveys which showed between 1.2 and 1.8 cars/farm and a relationship between number of cars and farm size, McChesney (1980) estimated an average of 1.45 cars/farm, later increased to 1.52 (McChesney, 1981), giving a total of 73,000 cars on full-time holdings in 1980.

The sample of 81 farms (see above) shows 1.38 cars/farm but the definition of "car" may differ between the surveys. The 1.10 light commercial vehicles/farm in Table A5.3 are "O" licence vans, utilities, station wagons, land rover/landcruiser/jeep types, pick-up etc and may have been described as cars in the other survey. Another possibility is that the multiple relicensing forms in some cases only record vehicles included in the farm account and cars are licensed separately. A further point is the trend towards purchase of commercial types to obtain tax depreciation concessions not available on cars, noted by McChesney (1981). It is therefore believed more appropriate to consider the holding of cars and light commercials together i.e. 2.48/farm for the sample.

King et alia (1982), for stock farming, found an average ownership of cars and light commercials for household purposes of 1.75 per household and 1.0 to 1.9 households per farm. This implies 1.75 to 3.3 cars and light commercial vehicles per farm or 84,000 to 158,000 nationally. The median of 2.5 light vehicles/farm is similar to that recorded in the sample of 81 farms. The average holding of light vehicles (cars and utilities etc.) for household purposes on farm probably lies between 1.5 and 2.5 per farm. In the absence of better information this has been taken as 1.75 of which 1.38 are cars and 0.37 are light commercials.

For farm trucks, the McChesney (1981) estimate of 38,000 and surveyed division into utilities and heavy vehicles have been used. The definition of a utility in this case is less than 3.7 tonne GVW (compare 2.0 tonne) but this is taken not to significantly affect the analysis

TABLE A5.5
ESTIMATED FUEL USE ON FARMS

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)
FARM-BASED VEHICLES:								
OFF-FARM USE (2):								
Household Purposes:								
Cars	66,000	14,000	11.3	104.4				
Light CVs	17,000	11,000	15.0	28.1	1,000	11,000	15.0	1.7
Motorcycles	38,000	400	5.0	0.8				
Sub-total	121,000			133.2				1.7
Farm Purposes:								
Light CVs, 2WD	11,000	5,200	15.0	8.6	150	5,200	10.0	0.1
Light CVs, 4WD	13,000	6,500	20.0	16.9	150	6,500	13.0	0.1
Medium trucks	4,875	4,500	28.0	6.1	1,625	4,500	28.0	2.0
Heavy trucks	4,000	6,300	40.0	10.1	3,200	8,100	40.0	10.4
Sub-total	32,875			41.7	5,125			12.6
ON-FARM USE (2)								
Light CVs, 2WD	11,000	2,800	15.0	4.6	150	2,800	10.0	0.0
Light CVs, 4WD	13,000	2,275	22.0	6.5	150	2,275	15.0	0.1
Medium trucks	4,875	500	28.0	0.7	1,625	500	28.0	0.2
Heavy trucks	4,000	700	40.0	1.1	3,200	900	40.0	1.2
Farm bikes	38,000	2,250	7.5	6.4				0.0
Tractors, crawler	3,400	7,500		1				4
Tractors, wheeled	22,800	58,800		17				77
Harvesters	0	4,300		1				6
Sub-total	97,075	79,125		38.3	5,125	6,475		88.5

bearing in mind the numerous other approximations. Using the breakdown into on-road and off-road and fuel type from Table A5.3 gives the values in Table A5.4.

Farm bikes and wheeled tractors are divided 50/50 between exempt and unregistered categories as previously noted. The division of tractors by fuel type is the same as in the Agriculture Statistics.

In total, there were an estimated 256,800 powered vehicles and machines based on farm properties in 1980. Of these, a little under 30% were estimated not to leave the farm, 25% to be licensed only for moving between farm blocks along public roads, and the remaining 45% to be licensed on-road vehicles. 30% of all farm based vehicles were diesel powered, but only 6% of licensed on-road vehicles were diesel.

A5.3 Fuel Use by Farms

Oil company deliveries to "Agriculture and Hunting" are not an accurate record of fuel delivered to farmers' tanks. Under-recording occurs because some farmers charge their deliveries through third parties who are not included in the "Agriculture and Hunting" category (McChesney, 1980), for example local service stations ("Resellers" category) and local cartage contractors ("Transport Internal" category). On the other hand, deliveries to "Agriculture and Hunting" also include deliveries to rural industries and business. McChesney (1980) notes that a small quantity of diesel is used in home heating.

Because of these uncertainities it is more satisfactory to build up an estimate of fuel consumption from a knowledge of farm operations than from gross supply statistics. It is important to obtain an assessment of how use is divided among on and off-farm operations in order to balance the total supply statistics of petrol and diesel fuel with form of use.

On-farm uses include non-vehicle

TABLE A5.5 (Contd)
ESTIMATED FUEL USE ON FARMS

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)	Number	km/yr (h/yr)	1/100 km (or 1/h)	1/yr (10^6)
FARM-BASED NON-VEHICLE USE:								
Chainsaws.....				2				
Irrigation pumps.....								1.5
Diesel Power generation								2
Crop Drying.....								7.8
Glasshouse and Poultry House Heating.....								8.2
Frost Protection Smoke Pots.....								0.5
Home Heating.....								4
Sub-total.....	0	0		2.0	0	0		24.0
AGRICULTURAL CONTRACTORS, ON-FARM:								
Top Dressing (4).....				0.5				6.1
Farm Maintenance (5)...				4				6.5
Land Development (6)...				1				5
Sub-total.....				5.5				17.6
CARTAGE CONTRACTORS AND FARM SERVICES:								
Heavy Cartage, Inwards.				5				15
(3) Outwards.....				10				30
Farm Services (7).....				25.5				6
Sub-total.....				40.5				51.0

Notes: (1) Does not include the use of other fuels and power - blended heating oil, kerosine aviation gasoline, fuel oils and electricity.
(2) Division into on- and off-farm use 35%/65% for light CVs, 10%/90% for farm trucks and 85%/15% for motorcycles (farm bikes). Source I. McChesney, pers. comm.
(3) Totals of 28 million litres and 56 million litres reduced by 24 million litres, being 80% of use by heavy farm trucks in carting own farm inputs and outputs.
(4) Includes ground spreading and loading of aircraft.
(5) 50% assumed done by contractors, remainder included in farm trucks and tractors on-farm use.
(6) 75% assumed done by contractors, remainder included in farm trucks and tractors on-farm use.
(7) Stock and Station Agents, veterinary Services etc.

consumption, principally of diesel fuel. Consumption is also attributable to agricultural contractors as well as farmers' vehicles.

Off-farm use includes farmers' transport of farm inputs and outputs, farm household vehicles, cartage contractors and other agricultural services.

Table A5.5 summarises fuel consumption estimates using data from McChesney (1980) adapted to correspond to the vehicle holdings assumed in Table A5.4. The fuel use totals compare with fuel supply and rebates on motor spirits duty as shown in Table A5.6.

McChesney(1980) notes from surveys that 65% of petrol used by farmers is delivered to the farm and 35% is purchased off farm. A relatively small quantity of diesel in drums is understood to be purchased off-farm. The estimated balance of petrol supply and use in round figures is therefore obtained as shown in Table A5.7.

A5.4 Fuel Use in Non-Agricultural Machines and Off-Road Vehicles

Cars, light commercial vehicles, heavy trucks, buses and motorcycles, that are on-road vehicles, have been accounted for in sections A6 to A12 of this report. All agricultural vehicles have been dealt with in the above paragraphs.

TABLE A5.5 (Contd)
ESTIMATED FUEL USE ON FARMS

ESTIMATED PETROL AND DIESEL USE BY YEAR

	Petrol					Diesel			
Year	Bikes	Tractors	Trucks	Other	Total	Tractors	Trucks	Other	Total
1985	8.5	11.6	49.0	1.0	70.0	91.5	29.6	6.0	127.1
1984	8.2	12.9	50.1	1.0	72.2	89.4	26.5	6.0	121.9
1983	8.0	14.1	51.2	1.0	74.3	87.3	23.4	6.0	116.7
1982	7.7	15.4	52.4	1.0	76.5	85.2	20.3	6.0	111.5
1981	7.4	16.7	53.5	1.0	78.6	83.1	17.2	6.0	106.3
1980	7.2	18.0	54.6	1.0	80.8	81.0	14.1	6.0	101.1
1979	6.8	18.8	53.9	1.0	80.5	78.6	13.9	6.0	98.5
1978	6.4	19.7	53.2	1.0	80.3	76.2	13.7	6.0	95.9
1977	6.0	20.5	52.4	1.0	80.0	73.8	13.5	6.0	93.3
1976	5.7	21.8	52.0	1.0	80.4	73.7	13.4	6.0	93.1
1975	5.3	23.0	51.6	1.0	80.9	73.6	13.3	6.0	92.9
1974	4.9	24.2	51.1	1.0	81.3	73.5	13.2	6.0	92.7

Notes: (1) Farm-purposes use by farm vehicles only. Excludes farm services, agricultural contractors, non-vehicle use, and farm household purposes.
(2) Consultants 1980 estimates used as base and pro-rata for other years using Table A5.2

TABLE A5.6
ESTIMATED FUEL USE BY FARMING (1979, 10^6 LITRES)

	Petrol	Diesel
Supply to Agriculture & Hunting	150.1	132
Farmers use on-farm	40.2	112.3
Farmers use off-farm	169.4	13.5
Agricultural contractors	5.5	17.6
Refunds on Motor Spirits Duty	66.1	

TABLE A5.7
FUEL USE ON- AND OFF-FARM (1979, 10^6 LITRES)

	Supply		Use		Total
	On-Farm	Off-Farm	On-Farm	Off-Farm	
Petrol	135	75	40	170	420
Diesel	120	5	110	15	250
	255	80	150	185	670

TABLE A5.7
POST OFFICE ANNUAL LICENCES FOR MISCELLANEOUS AND OFF-ROAD VEHICLES

Year (March)	Tractors On-Road	Hopper Spreaders	Fire Engines	Mobile Cranes	Mobile Machines	Class A	Class B	Total
1985	8,856	344	1,126	957	8,843	16,271	56,073	92,470
1984	8,461	523	1,177	1,047	8,677	14,353	59,965	94,203
1983	8,379	511	1,109	1,070	8,662	15,687	61,506	96,924
1982	8,259	447	1,133	1,073	8,731	15,975	72,768	108,386
1981	8,477	499	751	975	8,673	16,368	73,067	108,810
1980	8,207	485	987	925	7,534	15,732	74,639	108,509
1979	7,559	613	1,259	1,021	9,483	15,095	74,009	109,039

Notes: Class A for 1980 interpolated.
Prior to 1979 exempt vehicle classes were defined differently.
Approximately 50% of tractors estimated to be for agricultural use

TABLE A5.8
NON-AGRICULTURAL MOBILE MACHINES AND EXEMPT VEHICLES
RESULTS OF SAMPLE SURVEY OF FLEET OPERATORS

	% Frequency in Sample			
	Petrol	Diesel	Other	Total
Off-Road Trucks (EA)	3.1	2.7		5.8
Fork Lift Trucks (EA)	3.5	2.4	1.7	7.6
On-Road Tractors	2.5	11.4	0.1	14
Off-Road Tractors	3.7	12.5		16.2
Mobile Machines	10.9	45	0.5	56.4
Total	23.7	74	2.3	100

TABLE A5.9
ESTIMATED POPULATION OF LICENSED NON-AGRICULTURAL MOBILE MACHINES

	Petrol	Diesel	Other	Total
ON-ROAD VEHICLES:				
Tractors	700	3,400		4,100
Hopper Spreaders	300	200		500
Fire Engines	800	200		1,000
Mobile Cranes		900		900
Mobile Machines	1,100	6,300	100	7,500
On-Road Vehicles	2,900	11,000	100	14,000
OFF-ROAD VEHICLES:				
Tractors	1,100	3,700		4,800
Trucks	900	800		1,700
Fork Lift Trucks	1,100	700	500	2,300
Mobile Machines	1,100	6,000	100	7,200
Off-Road Vehicles	4,200	11,200	600	16,000

Note: Unregistered vehicles not included

This leaves a sizeable residue of other vehicles, mainly off-road, an unknown proportion of which are unregistered. Those which are registered are recorded in Post Office Licences as shown in Table A5.7.

A recent survey showed, for a sample of some 5,500 vehicles in these categories, a breakdown by fuel type as shown in Table A5.8. While it is not clear how representative this sampling is of the total, it covers almost 20% of the population and is some of the only information available.

Apart from the hopper spreaders and fire engines, which are assumed 60% diesel and 80% petrol powered, the remaining machines have been disaggregated into general type and motive power using the sample percentages, as shown in Table A5.9.

Fuel use by each of the these vehicles types is now considered.

From a survey of diesel vehicles, a breakdown of hours per year utilisation and proportions of off-road diesel vehicles is available. Table A5.10 is an adaptation of the survey results. The sample is large but unstructured and the use of sample statistics to represent the population is prone to some error. Fuel use per hour for construction equipment is taken to vary with gross weight between 10 and 30 litres/hour. Average use by non-agricultural tractors is assumed to be 5 litres/hour diesel and 7.5 litres/hour for petrol and the same values are used for stationary engines.

Fuel and power use by fork lift trucks is available from another source as shown in Table A5.11.

Fuel use by non-agricultural off-road trucks is assumed to be 40 litres/100 kilometres for 10,000 kilometres/year, ie. similar to off-road farm trucks.

These assumptions allow total fuel use by licensed mobile machines to be estimated, as shown in Table A5.12.

TABLE A5.10
FUEL USE BY OFF-ROAD MACHINES

NUMBERS SURVEYED AND HOURS OF OPERATION

	% of Total	Hours/ Year
Tractors, loaders etc	40%	900
Bulldozers,scrapers,graders,rollers etc	42%	900
stationary engines: compressors,cranes,drills	18%	500

HOURS OF OPERATION AND GROSS WEIGHT

For all categories, hours/year = 650 + 18 x gross weight
(approximate relationship)

GROSS WEIGHT AND FUEL CONSUMPTION

For earthmoving plant assume:

gross weight > 10 tonnes,	10 + gvw	litres/hour
gross weight < 10 tonnes,	10	litres/hour

Source: adapted from "Diesel Fleet Study", Murray North Ptnrs report to Liquid Fuels Trust Board, 1981

TABLE A5.11
FUEL USE BY FORK LIFT TRUCKS

	Relationship		Mean GVW	Fuel Use (l/h)	Hours /Year	Fuel Use (l)
Petrol.....	W/5000 + 3.2	l/h	4,000	4.0	1000	4000
Diesel.....	W/9000 + 2.0	l/h	6,000	2.7	1000	2667
LPG.....	W/4000 + 4.0	l/h	4,500	5.1	1000	5125
Electric.....	W/1500 + 1.5	kWh/h	4,500	4.5	1000	4500

Note: W is rated capacity in pounds

Source: "Energy Use by Forklift Trucks", Beca Carter Hollings & Ferner Ltd for Chloride Batteries (N.Z.)Ltd, 1979

TABLE A5.12
ESTIMATED FUEL USE BY LICENSED NON-AGRICULTURAL MISCELLANEOUS VEHICLES

Vehicle Type	Petrol				Diesel			
	Number	km/yr (h/yr)	l/100 km (or l/h)	l/yr (10^6)	Number	km/yr (h/yr)	l/100 km (or l/h)	l/yr (10^6)
ON-ROAD:								
Tractors	700	900	7.5	4.7	3,400	900	5	15.3
Hopper Spreaders	300	5000	20	0.3	200	5000	15	0.2
Fire Engines	800	5000	20	0.8	200	5000	15	0.2
Mobile Cranes	0				900	500	10	4.5
Mobile Machines	1,100	900	15	14.9	6,300	900	15	85.1
On-Road	2,900			20.7	11,000			105.1
OFF-ROAD:								
Tractors	1,100	900	7.5	7.4	3,700	900	5	16.7
Trucks	900	100	40	3.6	800	100	40	3.2
Fork Lifts	1,100	1000	4	4.4	700	1000	2.7	1.9
Mobile Machines	1,100	900	15	14.9	6,000	900	15	81.0
Off-Road	4,200			30.3	11,200			102.7
TOTAL	7,100			51.0	22,200			207.9

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APPENDIX 6

BUSINESS VEHICLE FLEET ANALYSIS

A6. BUSINESS VEHICLE FLEET ANALYSIS

This appendix discusses the holdings and pattern of use of business cars and light commercial vehicles.

A6.1 Number of Business Vehicles

Vehicles not owned by housholds can be defined as business vehicles. However a large number of vehicles owned by household members are nevertheless used to a greater or lesser extent for business purposes and, vice versa, business owned vehicles are used for non-business purposes.

The 1981 Population Census required information on the number of cars and vans in the care of houshold members on Census night, with a division into private and business ownership. Vehicles had to be "available for use" for inclusion. Table A5.4 summarises the results of this question and indicates some 160,000 business vehicles. This may be considered an under-estimate of the total of business vehicles due to:

(a) garaging at the workplace
(b) householders' interpretation of the "available for use" question
(c) a large proportion of "not specified" number of vehicles

The Census data cannot therefore be interpreted at its face value. The "not specified" omissions are greater for business than private vehicles (6.9% of households compared with 48.4%). The total of private vehicles can be estimated by redistributing the "not specified" category in proportion to other responses. A further allowance must be made for the exclusion of non-private dwellings from the Census; this amounts to an additional 0.9% of households, approximately.

The total of private cars and vans on this basis is 1,247,400. Deducting this from the relicensing total of 1,580,000 for March 1981 implies a business fleet size of 332,600.

The proportions of home:workplace garaging were surveyed by En-Consult Technology Ltd (1984) as 85:15 for cars and 70:30 for light commercials, excluding central government and farms.

It is not clear how farm households would interpret the Census questionnaire. If all farm-based cars and light commercials are regarded as business-owned, then the residual non-farm business vehicle total is smaller, as shown below:

estimated business fleet (Census)	332,600
deduct all farm vehicles	108,300
residual business vehicles	224,300
or:	
deduct farm operation vehicles	24,300
residual business vehicles	308,300

A further deduction of 25,400 government vehicles gives a range of 249,700 to 282,900 non-farm light business vehicles.

An alternative estimate for 1981 is available from En-Consult Technology Ltd (1984) which surveyed petrol vehicle fleets, except for farm and central government. Making suitable allowance

TABLE A6.1
DISTRIBUTION OF LIGHT VEHICLES BY BUSINESS/PRIVATE OWNERSHIP, 1981

Ownership	Vehicles (000s) Cars	Light CVs	Total
BUSINESS:			
Farms		24.3	24.3
Central Government	16.7	8.7	25.4
Other	180.5	128.4	308.9
	197.2	161.4	358.6
PRIVATE:			
Farm Households	66.0	18.0	84.0
Other Households	1,065.6		1,065.6
	1,131.6	18.0	1,149.6
TOTAL:	1,328.8	179.4	1,508.2

TABLE A6.2
ESTIMATE OF BUSINESS VEHICLE GARAGING

	Home	Workplace	Total
CARS:			
Farms			0.0
Central Government	8.3	8.4	16.7
Other	153.4	27.1	180.5
	161.7	35.5	197.2
LIGHT COMMERCIAL VEHICLES:			
Farms	24.3		24.3
Central Government		8.7	8.7
Other	89.9	38.5	128.4
	114.2	47.2	161.4
HEAVY COMMERCIAL VEHICLES:			
Farms	24.3	0	24.3
Central Government	8.3	17.1	25.4
Other	243.3	65.6	308.9
	275.9	82.7	358.6

for light vehicles (4,800 in 1981), the business vehicle fleet was estimated to be:

in fleets over 5 vehicles	134,100
in small fleets	158,400
diesel vehicles	4,800
	297,300

The estimate for small fleets depends upon a tentative extrapolation of survey data for fleets over 5 vehicles to smaller fleets. The estimate tends to support the assumption that farm households report their holdings of cars as "private" rather than "business". However the estimate based on the fleet survey is not firm and is probably a better estimate of the proportion of vehicle utilisation devoted to business rather than the proportion of the vehicle fleet under business ownership. However, for the present analysis the survey estimate has been used for fixing the proportion of light business vehicles for 1981 as shown in Table A6.1.

Applying the home:workplace garaging ratios, and making assumptions for central government vehicles gives a distribution of light business vehicles for 1981 as shown in Table A6.2.

For other years, the number of business cars has been assumed constant, in the absence of more refined analysis. Growth in the business fleet is confined to commercial vehicle types. Consequently, growth in the car fleet is assigned entirely to private ownership.

A6.2 Allocation of Vehicle Utilisation by Private/Business Purpose

Business-owned vehicles are used for private purposes and vice versa, private vehicles are used for business purposes.

TABLE A6.3
USE OF PRIVATE VEHICLES FOR PRIVATE AND BUSINESS PURPOSES

% of Vehicles	% Business Use Range	% Business Use Average	Annual kms	Average Utilisation
86	0	0		
4	0 - 50	25	18,000	4,500
10	50 - 100	75	20,000	15,000
100				1,680

Average percentage utilisation - Business 12
- Private 82

Equivalent number of business vehicles

1,328,800 x 1,680 / 20,000 = 111,600

Business vehicle use for private purposes was surveyed by En-Consult Technology Ltd (1984). The survey covers sectors other than government, agriculture and the transport industry. Overall the percentage of private running for these groups is estimated to be:

Purpose	Cars	Light CVs
business	75	90
commuting	15	7
private	10	3
	100%	100%

Local authority and government vehicles are used for commuting but to a lesser extent than in the private sector, and private use is not generally permitted.

Use of private vehicles for business purposes was included in the 1980/81 Household Expenditure Survey (Dept. of Statistics) from which the analysis in Table A6.3 has been made. It has been assured that the private vehicles also used for business are relatively high annual utilisation compared with private vehicles as a whole.

One point of interest from this analysis is that business use by private vehicles is equivalent to an additional 112,00 business vehicles. In reverse, the private running by business vehicles is equivalent to only 28,000 private vehicles.

A6.3 Annual Travel and Fuel Use

Annual travel and fuel use by farm vehicles, central and local government and for light commercial vehicles generally is discussed in the relevant appendices.

Annual travel and fuel consumption of business cars is taken from En-Consult Technology Ltd (1984) and is summarised in Table A6.4.

A6.4 Age and Size Composition of Business Vehicles

The engine size distribution and age distribution of business cars and light commercial vehicles surveyed in 1981 is shown in Table A6.5. The average engine size is larger for business cars than for the car fleet as a whole and the average age is less. The survey showed no clear relationship between age and annual travel but there was a slight variation in annual travel and engine size for business cars.

TABLE A6.4
FUEL USE BY BUSINESS VEHICLES

Vehicle Type	Number (000s)	Annual kms	Litres/ 100km	Litres (10^6)
CARS:				
Central Government	16.7	18,830	11.1	34.9
Other	180.5	22,475	11.1	450.3
	197.2			485.2
LIGHT COMMERCIAL VEHICLES:				
Farms	24.3	5,900	17.8	25.5
Central Government	8.7	15,260	11.1	14.7
Other	128.4	24,300	11.1	346.3
	161.4			386.6

TABLE A6.5
ENGINE SIZE AND AGE OF BUSINESS VEHICLES

CARS:

Engine Size cc	% of Fleet	Mean kms/ year
< 1300	30.3	19,600
1300-2000	53.2	24,100
> 2000	16.5	22,400
All	100	22,475
Mean Age	2.7 years	

LIGHT COMMERCIAL VEHICLES:

Engine Size cc	% of Fleet	Mean kms/ year
< 1300	48.7	24,300
1300-2000	24.3	22,900
> 2000	27.0	25,500
All	100	24,300
Mean Age	4.8 years	

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APPENDIX 7

CAR FLEET ANALYSIS

A7 CAR FLEET ANALYSIS

This appendix discusses data available on cars concentrating on general fleet characteristics and on private car ownership. Business cars, rental vehicles and taxis are discussed in other appendices.

A7.1 Definition

Cars are defined according to the Post Office description as passenger vehicles carrying a C licence. They have up to 9 passenger seats and generally cover body styles: saloon, station wagon, sports and convertible. Light bus body styles, where these are used as ancillary passenger vehicles, (ie. not in a licensed transport service), and provided they are 9 or fewer seats, also carry a C licence.

A7.2 Fleet Numbers and Fleet Composition

The car population has continued to grow in absolute terms and on a per capita basis. This trend is described in Appendix A1. It is in contrast to other vehicle types which have experienced only small rates of growth.

The composition of the car fleet in terms of engine size and body style has shown some significant changes over recent years. Average size has reduced from a peak in the mid-1970s and the proportions of vehicles in different engine size categories has changed. These changes are shown in Table A7.1.

TABLE A7.1 - NEW CAR REGISTRATIONS

Year	< 850	851-1000	1000-1100	1100-1200	1200-1300	<1300	<1300 %
1985	596	2177	766	310	20027	23876	28.47
1984	970	2596	913	370	23879	28728	29.18
1983	704	1818	908	1217	17034	21681	28.58
1982	742	3065	765	2837	19158	26567	31.08
1981	896	4072	544	3956	21410	30878	33.79
1980	25	3965	443	5154	19872	29459	37.59
1979	39	2414	1047	7627	17912	29039	40.99

Year	1301-1400	1401-1500	1501-1600	1601-1800	1801-2000	1301-2000	1300-2000 %
1985	2295	5319	11176	6858	25468	51115	60.94
1984	3337	7735	16253	7562	28082	62969	63.97
1983	5738	5375	11786	7821	18295	49015	64.62
1982	6294	7238	10506	8354	20932	53324	62.38
1981	7082	5087	10635	8415	23304	54523	59.67
1980	4137	1008	11843	6084	18279	41351	52.76
1979	513	1422	9073	5697	16426	33131	46.77

Year	2001-2500	2501-3000	3001-3500	3501-4000	4001-4500	4501-5000	>5000
1985	787	728	3111	238	3411	276	335
1984	433	566	2420	185	2653	215	268
1983	593	399	1828	119	1883	162	171
1982	646	362	2558	85	1546	190	201
1981	711	669	2711	114	1418	157	192
1980	572	715	3211	114	2243	315	391
1979	677	800	3253	105	2513	614	709

Year	>2000	>2000 %	TOTAL	MEAN CC
1985	8886	10.59	83877	1782
1984	6740	6.85	98437	1692
1983	5155	6.80	75851	1666
1982	5588	6.54	85479	1643
1981	5972	6.54	91373	1630
1980	7561	9.65	78371	1696
1979	8671	12.24	70841	1761

TABLE A7.2
CAR FLEET - MEAN AGE AND ENGINE SIZE

Year	Mean Age	Mean CC
1985	9.9	1750
1984		
1983		
1982		
1981		
1980	9.4	1840
1979		
1978	9.1	1900
1977		
1976		
1975		
1974	8.7	2120
1973		
1972	9.2	2070
1971		
1970	9.5	1870
1965		1700
1960	10.5	1575

Station wagons and, in more recent years, hatchback-type vehicles have formed an increasing proportion of the fleet and the dividing line between the conventional saloon car and station wagon has become blurred as more vehicles with fold-down rear seats and integral passenger/luggage compartments have come onto the market.

The average age of the fleet reduced from the 1950's until 1974 but has since increased as shown in Table A7.2. Cross sectional surveys of the vehicle fleet in 1972 and 1978/79 have provided reference points for the age and size composition of the car fleet.

The estimate of fleet age and size composition since 1978 is on the basis of new vehicle registrations, the fleet total and a modelled mortality function based on the 1972 to 1978 period as a baseline. Table A7.3 shows the modelled fleet age and engine size distribution for 1985 with a breakdown into private and business vehicles.

A7.3 Annual Travel

Annual kilometres of travel for private cars and cars generally have been reported in a number of surveys. A summary of data from these is given in Table A7.4.

In distinguishing private cars from business cars it has been assumed that the fleet characteristics of the business car fleet are relatively stable. Since business cars tend to be new, of slightly larger engine size, and with higher annual utilisation if follows that the residual private car fleet is generally older, of lower annual utilisation and slightly smaller average engine size.

TABLE A7.3 - FLEET COMPOSITION VEHICLES (000s)

	CARS - BUSINESS/PRIVATE BREAKDOWN											
	ENGINE SIZE BREAKDOWN			BUSINESS				PRIVATE				TOTAL
MODEL YEAR	<1350	1350-2000	>2000	<1350	1350-2000	>2000	TOTAL BUSINESS	<1350	1350-2000	>2000	TOTAL PRIVATE	
1985	24,599	53,918	5,771	11,510	25,229	2,700	39,440	13,088	28,688	3,071	44,848	84,288
1984	28,025	63,356	6,663	11,273	25,486	2,680	39,440	16,751	37,870	3,983	58,604	98,044
1983	23,415	46,998	4,925	12,258	24,604	2,578	39,440	11,157	22,395	2,347	35,899	75,339
1982	28,587	50,477	5,529	9,996	17,651	1,933	29,580	18,591	32,827	3,596	55,013	84,593
1981	33,826	47,481	8,682	7,413	10,405	1,903	19,720	26,413	37,076	6,779	70,268	89,988
1980	31,446	35,877	9,390	4,042	4,611	1,207	9,860	27,404	31,265	8,183	66,852	76,712
1979	26,105	30,956	11,730	1,497	1,775	673	3,944	24,608	29,181	11,057	64,847	68,791
1978	24,001	28,461	10,784	1,497	1,775	673	3,944	22,505	26,686	10,112	59,303	63,247
1977	21,359	25,327	9,597	1,497	1,775	673	3,944	19,862	23,553	8,924	52,339	56,283
1976	25,661	30,429	11,530	1,497	1,775	673	3,944	24,164	28,654	10,858	63,676	67,620
1975	28,921	34,295	12,995	374	444	168	986	28,547	33,851	12,827	75,225	76,211
1974	31,754	37,654	14,268	374	444	168	986	31,380	37,210	14,100	82,689	83,675
1973	33,548	39,782	15,074	374	444	168	986	33,174	39,338	14,906	87,417	88,403
1972	29,203	34,629	13,121	75	89	34	197	29,128	34,540	13,088	76,756	76,953
1971	20,260	24,025	9,103	75	89	34	197	20,186	23,936	9,070	53,192	53,389
1970	20,082	23,813	9,023	75	89	34	197	20,007	23,724	8,990	52,721	52,918
1969	14,647	17,368	6,581	37	44	17	99	14,609	17,324	6,564	38,497	38,596
1968	11,512	13,651	5,172	37	44	17	99	11,474	WCS8	5,156	30,236	30,335
1967	11,870	14,075	5,333	37	44	17	99	11,832	14,031	5,316	31,179	31,278
1966	11,360	13,471	5,105	2	2	1	5	11,359	13,469	5,104	29,931	29,936
older	53,099	62,966	23,859	2	2	1	5	53,097	62,963	23,858	139,919	139,924
TOTAL	533,278	729,009	204,236	63,942	116,820	16,349	197,200	469,336	612,189	187,887	1,269,411	1,466,523

Because the private car fleet comprises the majority of on-road vehicles, it is possible to detect changes in overall annual travel from traffic counts. Using the 1977 Ministry of Transport Driver Exposure Survey as a base, and the Ministry of Works index of urban and rural State Highway traffic counts, an approximate time series of total vehicle kilometres of travel (VKT) can be produced. Once business and commercial vehicles are deducted, the residual VKT can be compared against the private car fleet size and a tentative time series of annual kilometres per vehicle results. This is shown in Table A7.5.

A7.4 Fuel Consumption

Fuel supply to cars is obtained from the total supply less the estimated allocation to other vehicles. Petrol supply to other vehicles is changing over time, in particular with the rapid change from petrol to diesel motive power for heavy commercial vehicles. See the relevant appendices for details.

Once the fuel supply to cars has been identifies, fuel use by business vehicles is deducted using the following assumptions based upon flet surveys (En-Consult Technology Ltd, 1984).

TABLE A7.4
DATA ON ANNUAL TRAVEL BY CARS

NEWSPAPER ADVERTISEMENT SURVEY 1984

Mean utilisation..... 10,821 km/yr

Source: A Highway Economic Evaluation Model for New Zealand, Bennett C.R., Univ of Auckland, Dept of Civil Engineering, Report 368, 1985.

CNG MARKET SURVEY

Sample Survey of Petrol vehicles

PERCENT BY ANNUAL UTILISATION (kms/year)

	under 10,000	10,000-15,000	15,000-20,000	20,000-30,000	over 30,000	Approx Mean	Sample
Private	49.4	26.2	12.1	7.5	4.7	12,618	1129
Business	33.5	17.5	15.8	21.3	11.8	16,920	221
Public Body	13.3	33.3	20.0	13.3	20.0	18,985	30
All	46.1	25.0	12.9	9.9	6.2	13,485	1380

TABLE A7.5
TIME SERIES OF CAR ANNUAL TRAVEL

YEAR	CARS	VEHICLE-KILOMETRES OF TRAVEL (10^9)			DEDUCTIONS FOR OTHER VEHICLES (10^9 Vehicle-kms)							Private and Business Cars		deduct Business Cars	Private Cars Total kms (10^9)	Private Cars Annual Kms/car
		Urban	Rural	All	Light CVs	Heavy CVs	Buses	Motor-Cycles	Misc.	Taxis	Rental Car	Total kms	Annual Kms/car			
1985	1,481,822			27.65	4.93	1.55	0.15	0.57	0.02	0.17	0.26	20.00	13,494	4.37	15.62	12,163
1984	1,432,779	15.38	10.92	26.29	4.87	1.51	0.13	0.58	0.02	0.18	0.19	18.81	13,128	4.37	14.44	11,685
1983	1,394,109	14.66	10.35	25.01	4.71	1.53	0.13	0.59	0.02	0.17	0.19	17.67	12,676	4.37	13.30	11,113
1982	1,360,477	14.02	9.94	23.96	4.54	1.54	0.13	0.60	0.02	0.18	0.16	16.78	12,337	4.37	12.41	10,671
1981	1,319,305	13.46	9.59	23.05	4.21	1.48	0.13	0.57	0.02	0.19	0.16	16.29	12,348	4.37	11.92	10,622
1980	1,283,661	13.05	9.28	22.33	3.98	1.47	0.13	0.51	0.02	0.18	0.16	15.89	12,376	4.37	11.51	10,599
1979	1,244,751	12.73	9.09	21.82	3.91	1.43	0.13	0.43	0.02	0.18	0.14	15.58	12,517	4.37	11.21	10,700
1978	1,215,638	12.57	9.06	21.63	3.63	1.44	0.12	0.43	0.02	0.18	0.14	15.66	12,881	4.37	11.29	11,083
1977	1,200,003	12.53	9.02	21.56	3.52	1.46	0.12	0.44	0.02	0.19	0.15	15.66	13,050	4.37	11.29	11,257
1976	1,172,000	12.49	8.99	21.49	3.11	1.41	0.12	0.42	0.02	0.19	0.14	16.08	13,720	4.37	11.71	12,011
1975	1,129,611	12.45	8.96	21.42	2.99	1.43	0.12	0.38	0.02	0.19	0.14	16.15	14,296	4.37	11.78	12,632
1974	1,078,795	12.41	8.93	21.34	2.95	1.34	0.11	0.36	0.02	0.18	0.13	16.25	15,066	4.37	11.88	13,478
1973	1,020,778	11.85	8.90	20.75	2.80	1.37	0.11	0.30	0.02	0.18	0.11	15.87	15,543	4.37	11.49	13,957
1972	955,446	11.21	8.46	19.67	2.68	1.39	0.12	0.26	0.02	0.18	0.10	14.92	15,621	4.37	10.55	13,918
1971	908,253	10.57	8.05	18.62	2.52	1.36	0.12	0.22	0.02	0.18	0.10	14.11	15,532	4.37	9.74	13,692
1970	861,958	7.92	6.04	13.97	2.37	1.30	0.13	0.20	0.02	0.18	0.08	9.70	11,250	4.37	5.33	8,011

TABLE A7.6 - MODELLED CAR FUEL USE, 1985

MODEL YEAR	BUSINESS CARS <1350 CC	BUSINESS CARS 1350-2000 CC	BUSINESS CARS >2000 CC	BUSINESS CARS TOTAL	PRIVATE CARS <1350 CC	PRIVATE CARS 1350-2000 CC	PRIVATE CARS >2000 CC	PRIVATE CARS TOTAL	TOTAL CARS
1985	17.09	57.29	6.94	81.33	7.81	29.58	6.59	43.98	125.31
1984	16.91	58.46	6.96	82.33	11.73	44.56	8.82	65.11	147.44
1983	18.57	57.00	6.76	82.33	4.23	15.80	4.31	24.33	106.66
1982	14.64	39.51	4.90	59.05	13.36	39.13	7.65	60.13	119.18
1981	10.47	22.47	4.65	37.59	20.82	47.39	13.96	82.16	119.75
1980	5.50	9.58	2.84	17.92	21.86	40.05	16.10	78.02	95.93
1979	1.95	3.54	1.52	7.02	19.30	36.53	20.62	76.45	83.47
1978	1.97	3.57	1.53	7.08	16.22	30.71	17.40	64.33	71.42
1977	1.99	3.61	1.55	7.15	13.66	25.89	14.74	54.29	61.44
1976	2.01	3.64	1.56	7.22	16.14	30.55	17.31	64.00	71.21
1975	0.51	0.92	0.39	1.82	19.18	36.16	20.08	75.41	77.23
1974	0.51	0.93	0.40	1.84	20.25	38.17	21.18	79.60	81.43
1973	0.52	0.94	0.40	1.85	21.61	40.74	22.61	84.96	86.82
1972	0.10	0.19	0.08	0.37	19.16	36.09	19.95	75.19	75.56
1971	0.10	0.19	0.08	0.37	12.58	23.70	13.11	49.40	49.77
1970	0.10	0.19	0.08	0.37	11.80	22.23	12.29	46.33	46.70
1969	0.05	0.09	0.04	0.19	8.14	15.34	8.47	31.96	32.14
1968	0.05	0.09	0.04	0.19	6.01	11.31	6.25	23.57	23.76
1967	0.05	0.09	0.04	0.19	5.80	10.92	6.04	22.76	22.95
1966	0.00	0.00	0.00	0.01	5.22	9.83	5.42	20.47	20.48
older	0.00	0.00	0.00	0.01	24.42	45.95	25.35	95.72	120.15
TOTAL	93.12	262.31	40.79	396.21	299.31	630.63	288.24	1218.18	1638.80

<u>engine size</u>:

$F = 4 + 3.75L \ (L <= 2.4)$
$F = 9 + 1.67L \ (L >= 2.4)$

where

F = litres/100 km
L is engine size, litres

<u>annual utilisation</u>:

$F = Fo \ (1 + 0.015. \ AKM. \ 10^{-4})$

Fo is fuel consumption at average annual utilisation.
AKM is annual kilometres difference from the average annual utilisation.

The resulting fuel utilisation for private cars is shown in Table A7.6.

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APPENDIX 8

LIGHT COMMERCIAL VEHICLE ANALYSIS

A.8 LIGHT COMMERCIAL VEHICLE ANALYSIS

Light commercial vehicles are here defined as goods service vehicle body styles with a gross weight of under 2 tonnes. The 2 tonne limit is recognised in current legislation but for practical purposes the 3.5 tonne limit as used by Road User Charges, is a better division between light and heavy vehicles. This appendix retains the existing classification but also covers the 2.0 to 3.5 tonne range and, to this extent, overlaps with Appendix A9.

A8.1 Light Commercial Vehicle Numbers

The Post Office relicensing statistics of light goods vehicles also include light bus body styles where these are not used for licensed transport operations.

The light commercial fleet composition for recent years is shown in Table A8.1. Light trailers are also

TABLE A8.1
LIGHT GOODS VEHICLES - POST OFFICE LICENCES

Year	Trucks & Vans	Other	Total	Light Trailers
1985	206,287	3,583	209,870	372,564
1984	203,799	3,469	207,268	367,986
1983	197,312	3,004	200,316	363,698
1982	190,440	2,881	193,321	366,509
1981	176,653	2,696	179,349	355,745
1980	166,379	2,782	169,161	350,208
1979	163,864	2,555	166,419	342,403
1978	151,938	2,529	154,467	327,081
1977	146,238	3,399	149,637	323,992
1976	129,193	3,033	132,227	297,703
1975	124,760	2,613	127,373	274,681
1974	123,019	2,446	125,465	250,108
1973	116,768	2,315	119,083	217,664
1972	112,347	1,777	114,124	202,042
1971	105,868	1,529	107,398	189,384
1970	99,593	1,118	100,711	178,492

Note: light trailers are total Post Office trailer licences less an allowance for heavy trailers obtained from road user charges data.

TABLE A8.2
LIGHT COMMERCIAL VEHICLES - MOTIVE POWER

SURVEY OF THE N.Z. COMMERCIAL GASOLINE FLEET ,1981

Petrol	95.9
Diesel	2.1
CNG	0.8
LPG	1.4
	100

Source: Post Office MR1A Multiple Relicensing Records 1981. Mainly larger fleets.

Source: "Survey of the New Zealand Commercial Gasoline Fleet, Survey Methods and data Report", Liquid Fuels Trust Board, August 1984

N.Z. GOVERNMENT VEHICLE FLEET STUDY

Fuel Distribution %	Vans <1 tonne	Trucks 1-2 tonne
Petrol	96	99.4
Diesel		0.3
Alcohol Blend	4	0.3
CNG		
	100	100

LIGHT COMMERCIAL VEHICLES IN AGRICULTURE, 1981 (see Appendix 5)

	Vehicle (000s)		
	Petrol	Diesel	Total
On Farm			
- household.....	17.0	1.0	18.0
- farm.....	23.1	1.2	24.3
Agricultural Contractors & Farm Services.....	0.9	0.1	1.0
Total	41.0	2.3	43.3

shown; the division by trailer type can be made from a 1984 printout of data from the Wanganui computer which showed the following breakdown:

domestic trailers	57%
boat trailers	14%
caravan trailers	17%
commercial trailers	12%
	100%

A8.2. Distribution by Motive Power

Until recently almost all light commercial vehicles were petrol powered. However, in the last few years both diesel and gas fuels have made inroads.

Diesel powered vehicles are best estimated from Road User Charges and Wanganui computer data.

A number of surveys have identified motive power distribution in the light commercial fleet. A summary of these is given in Table A8.2. From these data a distribution of motive power for recent years has been estimated as shown in Table A8.3.

A8.3 Distribution by Sector

The Post Office definition of light goods vehicles is by licence label. Apart from farm households, light commercial vehicles garaged at home are assumed to be associated with some form of business enterprise, rather than being primarily for domestic use, and are therefore licensed as goods vehicles (O licence) rather than as cars(C licence). This is not entirely accurate since some light van and utility body styles carry C licences and, vice versa, some station wagons and hatchbacks carry O licences (see Table A8.4).

The distribution of light commercial vehicles by user is available from a number of sample surveys and official

TABLE A8.3

LIGHT GOODS VEHICLES - MOTIVE POWER

Year	Petrol	Diesel	LPG	CNG	Total
1985	179,231	4,407	6,222	20,010	209,870
1984	185,544	4,353	3,111	14,260	207,268
1983	185,545	4,207	1,525	9,039	200,316
1982	183,332	4,060	1,214	4,715	193,321
1981	171,921	3,766	1,062	2,599	179,349
1980	164,117	3,552	802	690	169,161
1979	162,135	3,495	629	161	166,419
1978	150,746	3,244	477		154,467
1977	146,126	3,142	369		149,637
1976	129,255	2,777	195		132,227
1975	124,699	2,675			127,373
1974	122,830	2,635			125,465
1973	116,583	2,501			119,083
1972	111,728	2,397			114,124
1971	105,142	2,255			107,398
1970	98,596	2,115			100,711

TABLE A8.4
BODY STYLE AND LICENCE LABEL - LIGHT VEHICLES

Body Style	Percentages			
	Car "C" Label	Commercial "O" Label	Commercial "K" Label	
Light Van	54.0	51.0	17.2	
Utility	32.5	25.3		
Heavy Van				
Artic Truck				
Flat Deck Truck		11.9	34.4	
Other Truck	13.5	11.8	48.4	
Commercial Styles	100	100	100	
	7.7	87.9	4.4	100

statistics. Data from these sources are shown in Table A8.5.

From this information a breakdown of light commercial vehicles by sector has been developed as shown in Table A8.6.

A8.4 Annual Travel

Annual travel varies in the range 10,000 to 25,000 km/year depending on the user. Annual travel per vehicle is highest among licensed road transport and business vehicles and lowest among Government and farm vehicles. Petrol vehicles travel less far in a year than diesel or gas powered vehicles. Overall, annual travel by light commercial vehicles averages about 16,000 km/year.

Survey data on annual travel is given in Table A8.7. This has been used to develop annual travel by user and motive power as shown in Table A8.8.

A8.5 Fuel Consumption

Fuel consumption rates for light commercial vehicles are similar to cars of similar gross weight. The fuel consumption relationships used for business cars have been extended to light commercial vehicles also. The resulting fuel allocations to light commercial vehicles are shown in Table A8.9.

TABLE A8.5
LIGHT VEHICLES - DISTRIBUTION BY SECTOR

SURVEY OF THE N.Z. COMMERCIAL GASOLINE FLEET ,1981

Industry Sector	Petrol Vehicles in Fleets (000s)		
	> 5 vehs	<= 5 vehs	Total
(Agriculture).....	0.0	0.0	0.0
Forestry.....	1.0	0.6	1.6
(Fishing).....	0.0	0.0	0.0
Mining.....	0.4	0.6	1.0
Manufacture - metals.....	1.2	5.0	6.2
- other.....	4.2	6.5	10.7
Electricity,Water & Gas.....	0.4	0.2	0.6
Building & Construction.....	5.5	15.1	20.6
Wholesale & Retail Trade.....	5.4	41.4	46.8
Restaurants, Hotels etc.....	1.1	9.4	10.5
Bus Services.....	0.1		0.1
Taxis.....	0.0	0.0	0.0
Freight Transport.....	0.7	1.9	2.6
Rental Services.....	1.2		1.2
Other Transport.....	0.0	0.2	0.2
Finance, Business Services....	6.0	2.6	8.6
(Central Government).....	0.0		0.0
County Councils.....	1.0	0.3	1.3
Urban Councils.....	2.4	0.3	2.7
Other Local Government.....	1.0	0.4	1.4
Sanitary etc Services.....	0.7		0.7
Social and Recreational Serv..	4.6	4.2	8.8
Personal & Household Servs....	1.7	5.8	7.5
(International Bodies).....	0.0		0.0
Totals.....	38.6	94.5	133.1

AVERAGE FLEET SIZE:

Farming	1.7
Manufacturing	6.2
Construction	5.5
Wholesale, Retail	4.5
Service Industry	4.6

Source: Post Office MR1A Multiple Relicensing Records 1981. Mainly larger fleets.

Source: "Survey of the New Zealand Commercial Gasoline Fleet, Survey Methods and data Report", Liquid Fuels Trust Board, August 1984

TABLE A8.5 (Contd)
LIGHT COMMERCIAL VEHICLES - FLEET NUMBERS

N.Z. GOVERNMENT VEHICLE FLEET STUDY

Department	Vans <1 tonne	Trucks 1-2 tonne
Agriculture	0	100
N.Z. Forest Service	50	244
Post Office	51	804
Works & Development	0	788
Other	10	353
Total	111	2289
Age Distribution %		
less than 1 year	4	1
1 to 2	48	15
2 to 3	9	20
3 to 4	3	4
4 to 5	4	21
5 to 10	32	38
over 10 years	1	1
Total	100	100
Use Distribution %		
Local	92	95
Long distance	5	3
Local & long dist.		1
Urban only	3	1
Off-road		
	100	100
Engine Size %		
< 1000 cc	19	9
1000-1500	71	32
1500-2000	6	55
2000-2500	2	2
2500-3000		
> 3000 cc	1	2
	100	100
Mean CC	1328	1604

TABLE A8.5 (Contd)
LIGHT COMMERCIAL VEHICLES - FLEET NUMBERS

CNG MARKET DEVELOPMENT STUDY, NZERDC, 1984

Light Vehicle Type	% of Sample Survey	
	Private	Business
Light Van, Utility.....	3.5	11.8
Medium Van, Utility.....	6.0	26.9
Other.....	90.5	61.3
All.....	100	100
	54%	46%

TABLE A8.6
LIGHT COMMERCIAL VEHICLES BY SECTOR, 1984 (000s)

NZSIC	Sector Description	Petrol	Diesel	LPG/CNG	Total
11	Agriculture and Hunting	23.1	1.2		24.3
12	Forestry and Logging	1.6		0.2	1.8
13	Fishing				
2	Mining and Quarrying	1.0		0.1	1.1
3	Manufacture - metal	6.0	0.1	0.9	7.0
	- other	10.6	0.1	1.4	12.1
4	Water, Power and gas	0.6		0.1	0.7
5	Building and Construction	21.5	0.2	2.7	24.4
61/62	Wholesale and Retail	47.6	0.5	6.3	54.4
6281	Vehicle Dealers and Wreckers	3.9			3.9
63	Restaurants and Hotels	10.4	0.1	1.4	11.9
71	Transport and Storage				
711	Rail				
7112/3	Bus	0.1			0.1
7113	Taxi				
71151	Rental	1.3			1.3
7114	Freight	2.9	0.8		3.7
712	Water	0.1			0.1
713	Air				
7116/91	Support to Transport	0.1			0.1
7192	Storage				
72	Communications	3.8			3.8
8	Financial and Business	8.5	0.1	1.2	9.7
9101	Central Government Admin	0.3			0.3
9102	Local Government Admin	6.1	0.1	0.9	7.2
92	Sanitary Services	0.8			0.8
93/4/6	Social, Community, Recreational	9.7	0.1	1.2	11.0
95	Personal, Household Services	8.4	0.1	1.0	9.5
99	Household - farm	17.0	1.0		18.0
	Households - other				
	All	185.5	4.4	17.4	207.3

TABLE A8.7
LIGHT COMMERCIAL VEHICLES - ANNUAL TRAVEL DATA

SURVEY OF THE N.Z. COMMERCIAL GASOLINE FLEET ,1981

Light Commercial Body Styles.....	24,300

N.Z. GOVERNMENT VEHICLE FLEET STUDY

Van and Truck < 2 tonne.....	15,258

LIGHT COMMERCIAL VEHICLES IN AGRICULTURE, 1981 (see Appendix 5)

On Farm:	
- household.....	11,000
- farm, 2 wheel drive.....	13,000
- farm, 4 wheel drive.....	14,500

ROAD USER CHARGES DATA

1978/79:	<= 1 t	17,400	(mainly
	1.1-2.0 t	18,480	diesel
	2.1-3.0 t	10,030	powered)

1980/81:	Petrol	Diesel	LPG/CNG	All	Trailers
1.0-2.9 t	16,042	18,467	22,036	17,367	7,936
3.0-4.9 t	10,856	16,546	16,803	12,579	9,024

Source: Roading Directorate, Ministry of Works

MINISTRY OF TRANSPORT CERTIFICATES OF FITNESS SURVEY, 1983

	2.0-3.5 t
Ancillary.....	12,855
Licensed.....	25,012
Government.....	12,116
Local Authority.....	15,905
All.....	14,469

N.Z. VEHICLE FLEET COMPOSITION STUDY, 1978/79

Light vans.....	15,405
Utilities.....	16,736

Source: "N.Z. Vehicle Fleet Composition Study, Sample Survey of Post Office Records of Vehicle Registration and Annual Licensing", Beca Carter Hollings and Ferner Ltd, for Liquid Fuels Trust Board, Jan 1980.

TABLE A8.8
ANNUAL TRAVEL BY MOTIVE POWER AND USER, (kms/year)

Ancillary Transport	25000	25000	25000	25000
Government Administration	15000	15000	30000	15000
Licensed Transport	25000	25000	25000	25000
Household	11000	11000		11000
All	23300	21600	25300	23500

TABLE A8.9
FUEL USE BY LIGHT COMMERCIAL VEHICLES (1984)

	Petrol Litres (10^6)	Diesel Litres (10^6)	LPG/CNG PJ	Total
Ancillary Transport	428.7	6.0	1.43	436.1
Government Administration	12.5	0.2	0.11	12.7
Licensed Transport	55.9	2.3	0.13	58.3
Household	22.4	1.1	0.00	23.5
All	519.5	9.5	1.67	530.7

TABLE A8.9 (Contd)
LIGHT GOODS VEHICLES - FUEL USE

Year	Petrol Litres (10^6)	Diesel Litres (10^6)	LPG PJ	CNG PJ	Total PJ
1985	501.8	9.6	0.6	1.9	19.1
1984	519.5	9.5	0.3	1.4	18.8
1983	519.5	9.2	0.1	0.9	18.2
1982	513.3	8.9	0.1	0.5	17.5
1981	481.3	8.2	0.1	0.2	16.2
1980	459.5	7.8	0.1	0.1	15.3
1979	453.9	7.6	0.1	0.0	15.1
1978	422.1	7.1	0.0	0.0	14.0
1977	409.1	6.9	0.0	0.0	13.5
1976	361.9	6.1	0.0	0.0	12.0
1975	349.1	5.8	0.0	0.0	11.5
1974	343.9	5.8	0.0	0.0	11.3
1973	326.4	5.5	0.0	0.0	10.8
1972	312.8	5.2	0.0	0.0	10.3
1971	294.4	4.9	0.0	0.0	9.7
1970	276.0	4.6	0.0	0.0	9.1

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APPENDIX 9

HEAVY COMMERCIAL VEHICLES ANALYSIS

A9 HEAVY COMMERCIAL VEHICLES ANALYSIS

A9.1 Fleet Size

The Post Office relicencing statistics denote all vehicles not otherwise identified as goods services vehicles. These include buses which are not public motor vehicles, in particular buses owned by Government (except NZR Road Services), that is about 850, mainly Education Department school buses (700). Privately owned buses are also included, where these are confined to personal use or carriage of employees. These buses are generally believed to be petrol powered.

The heavy goods vehicle fleet size and breakdown of new registrations for recent years is shown in Table A9.1. A rapid turnover of heavy goods vehicles in the 1980s has reduced the average fleet age substantially.

TABLE A9.1
HEAVY GOODS VEHICLES - POST OFFICE LICENCES

Year	trucks & vans	Tractors	Other	Total
1985	76,570	1,893	3,676	82,139
1984	74,185	1,786	4,119	80,090
1983	75,753	1,496	3,580	80,829
1982	76,372	1,238	3,283	80,893
1981	74,060	999	2,662	77,721
1980	73,262	676	2,934	76,872
1979	71,016	510	2,898	74,424
1978	71,648	642	3,000	75,290
1977	72,669	232	3,071	75,972
1976	70,720	662	2,326	73,708
1975	71,467	987	2,371	74,825
1974	67,158	583	2,153	69,895
1973	67,935	744	2,770	71,449
1972	69,271	983	2,556	72,810
1971	67,115	791	3,279	71,185
1970	64,948	708	2,137	67,793

Source: Post Office, March Quarter statistics

Note: pre-1978 breakdown derived from other quarterly data (Sept, June)

POST OFFICE NEW COMMERCIAL VEHICLE REGISTRATION STATISTICS

Year	2001-2500	2501-3200	3201-4500	4501-6500	6501-7500	7501-9000	9001-10500	10501-12000	12001-14500	14501-15000	15001-16000	16001-18000	18001-20500	20501-23000	>23000	HEAVY >2000	MEAN GV HCVs
1985	6,219	2,641	1,579	997	295	170	387	215	575	15	33	30	117	344	630	14,247	5,410
1984	7,485	1,771	1,643	1,057	201	218	333	271	726	17	37	33	130	381	698	15,001	5,518
1983	6,666	884	1,249	936	117	196	276	136	534	11	38	17	144	297	410	11,911	5,183
1982	7,228	897	1,053	1,014	107	189	225	42	637	17	3	42	191	245	378	12,268	4,999
1981	5,586	695	922	892	39	219	189	62	554	29	7	44	249	251	354	10,092	5,485
1980	3,635	935	781	660	23	140	205	116	538	16	13	47	244	306	308	7,967	6,215
1979	2,366	1,039	774	427	61	182	236	121	632	16	8	27	300	257	282	6,728	6,958
1978	2,229	990	717	444	84	202	235	120	626	14	7	24	265	227	249	6,433	6,873
1977	2,211	904	615	509	80	200	276	377	697	38	38	37	332	227	266	6,807	7,471

WEIGHT IN LBs	5001-7000	7001-10000	10001-12000	12001-15000	15001-20000	20001-22000	22001-27000	>27000	HEAVY >2000	MEAN GV HCVs
1976	1,864	937	145	454	318	229	791	1,489	6,227	8,423
1975	1,797	673	279	427	270	181	788	1,463	5,878	8,576
1974	1,381	629	157	322	278	189	797	1,472	5,225	9,234
1973	1,276	577	168	247	333	228	931	1,477	5,237	9,488
1972	1,232	603	166	331	320	237	801	1,106	4,796	8,762
1971	1,381	693	166	260	368	221	806	1,010	4,905	
1970	1,406	611	173	399	308	287	841	1,156	5,181	

A9.2 Fleet Distribution by Motive Power

A number of data sources are available as shown in Table A9.1. Road User Charges statistics provide the best guide to fleet composition by gross weight and motive power. In this context, gross licensed weight refers to the Road User Charges licence and not to the weight given in annual relicensing of the vehicle; nor is licensed weight the same as manufacturer's stated gross vehicle weight.

TABLE A9.2
HEAVY COMMERCIAL VEHICLE FLEET DATA - GROSS WEIGHT AND MOTIVE POWER

N.Z. TRANSPORT POLICY STUDY, 1972

Gross Weight (tonnes)	% Distribution Petrol	Diesel	All
2.0 - 2.5	3.7	0.2	2.6
2.6 - 5.0	29.0	0.4	20.4
5.1 - 10.0	23.7	3.2	17.6
10.1 - 15.0	40.8	41.5	41.0
15.1 - 20.0	1.6	31.3	10.5
20.1 - 30.0	1.2	20.9	7.1
over 30.0	0.1	2.5	0.8
All	100	100	100

STATISTICS OF THE LICENSED ROAD TRANSPORT INDUSTRY

Gross Weight (tonnes)	1963	1971	1976	1978
2.0 - 5.0	2.5	5.8	9.2	12.1
5.1 - 10.0	46.5	24.2	24.1	22.5
10.1 - 15.0	37.9	49.0	41.2	32.2
15.1 - 20.0	6.0	9.8	16.0	18.0
over 20.0	2.9	11.2	9.5	9.4
All	95.8	100	100	94.2

N.Z.VEHICLE FLEET COMPOSITION STUDY

Gross Weight (tonnes)	% Distribution Petrol	Diesel	All
2.0 - 5.0	40	3	27
5.1 - 10.0	41	14	31
10.1 - 15.0	17	57	31
15.1 - 20.0	2	10	5
20.1 - 30.0	1	15	6
over 30.0		1	
All	101	100	100

N.Z. GOVERNMENT VEHICLE FLEET STUDY

Gross Weight (tonnes)	% Distribution Petrol	Diesel	All
2.0 - 5.0	72.6	18.1	
5.1 - 10.0	23	54.5	
10.1 - 15.0	4.1	18.6	
over 15.0	0.3	8.7	
All	100	100	

DIESEL VEHICLE FLEET STUDY

Gross Weight (tonnes)	Single Unit Trucks
2.0 - 5.0	4.9
5.1 - 10.0	19.7
10.1 - 15.0	42.0
15.1 - 20.0	20.9
20.1 - 30.0	6.7
over 30.0	5.8
All	100

TABLE A9.3
DISTRIBUTION OF MOTIVE POWER - ROAD USER CHARGES STATISTICS

PERCENTAGE OF VEHICLES DIESEL POWERED

Gross Weight	1977	1980/81	1983/84	1984/85
1.0	0.2		99.7	100.0
2.0	9.3	86.2	98.5	98.8
2.5	12.0			
3.0	5.8	62.0	84.0	87.6
under 3.0	0.3	77.1	92.9	94.5
3.5	6.1			
4.0	10.4		47.3	63.0
5.0	16.0	21.8	39.5	48.2
3.1 - 5.0	11.2	21.8	43.1	55.0
10.0	26.8	23.2	43.1	48.6
15.0	73.9	69.9	82.6	84.9
20.0	89.1	94.8	97.9	95.1
25.0	92.0	97.4	98.7	99.6
over 25.0		97.1	99.6	91.9
over 5.0	52.6	55.4	69.3	71.9
over 2.0	37.8	53.6	66.3	70.4
over 3.5	45.5	53.4	65.6	69.5

The distance licence statistics cover on-road vehicles over 3.5 tonnes and diesel powered vehicles under 3.5 tonnes. Buses and some other vehicles classed as miscellaneous by the Post Office are also included.

A comparison of Road User Charges data for selected years shows the changing mix of motive power (Table A9.3).

For the 1978/79 and 1980/81 statistics CNG and LPG vehicles were required to be licenced; this is not so for 1983/84. The unspecified motive power category in 1978/79 and 1980/81 may include some gas-fuelled vehicles. It is understood that the 1980/81 unspecified category are 80% less than 3 tonnes, which means they are either diesel or gas powered. Comparing the 1980/81 with the 1983/84 data, it appears that most of the unspecified category may be gas-powered since the total of diesel vehicles in the 1 to 3 tonne category for 1980/81 is similar to 1983/84. The total of gas-powered vehicles at the end of 1980 was 6369 CNG (kit sales) and an unknown number, but probably about 3000, LPG vehicles.

In redistributing the unspecified category the assumptions made are:

1987/79: in proportion to petrol and diesel figures

TABLE A9.4
HEAVY VEHICLES BY MOTIVE POWER

Year	Petrol %	Diesel %
1985	27.6	72.4
1984	30.1	69.9
1983	33.9	66.1
1982	37.8	62.2
1981	41.6	58.4
1980	42.1	57.9
1979	42.6	57.4
1978	43.1	56.9
1977	43.7	56.3
1976	48.7	51.3
1975	53.9	46.1
1974	59.1	40.9
1973	64.5	35.5
1972	70.1	29.9
1971	75.2	24.8
1970	79.9	20.1

1980/81: assume 20% distributed in proportion to petrol and diesel figures; of the remaining 80%, assume enough are diesel to equate the 1980/81 and 1893/84 figures for vehicles of up to 2 tonnes, the remainder gas.

1983/84: in proportion to petrol and diesel figures

The redistributed numbers are then as shown in Table A9.4. (excluding

TABLE A9.5
HEAVY VEHICLE DISTRIBUTION BY GROSS WEIGHT AND OPERATOR

M.O.T. CERTIFICATES OF FITNESS SURVEY 1972

Gross Weight (tonnes)	% Distribution			
	Ancillary	Licensed	Government	Local Body
2.0 - 2.5	0.9	5.0	1.6	0.2
2.6 - 5.0	26.5	10.1	37.1	18.1
5.1 - 10.0	24.5	10.3	15.3	16.4
10.1 - 15.0	40.9	40.8	41.7	35.6
15.1 - 20.0	4.9	18.3	1.8	3.2
20.1 - 30.0	1.9	14.3	2.0	1.5
over 30.0	0.4	1.3	0.3	0.3
All	100	100	100	75
% Distribution	43.1	41.4	8.9	6.6

TABLE A9.6
HEAVY VEHICLE FLEET BY GROSS WEIGHT AND MOTIVE POWER

Year	Petrol Powered by Gross Weight							
	2.0 3.5	3.5 5.0	5.0 10.0	10.0 15.0	15.0 20.0	20.0 30.0	over 30.0	Total Petrol
1985	5,217	1,487	10,294	3,389	435	55		20,878
1984	5,300	1,800	10,762	3,900	175	154		22,091
1983	5,664	2,235	11,940	5,093	269	200	4	25,404
1982	5,966	2,683	12,928	6,310	360	239	8	28,494
1981	6,034	3,047	13,334	7,314	434	264	12	30,439
1980	6,217	3,484	12,662	7,182	542	374	15	30,476
1979	6,269	3,860	11,770	6,898	632	458	17	29,904
1978	6,570	4,410	11,375	6,883	744	544	19	30,546
1977	6,914	5,024	11,039	6,891	861	621	22	31,372
1976	6,974	5,454	11,000	9,159	830	612	23	34,052
1975	7,296	6,110	11,335	11,844	831	619	24	38,059
1974	7,092	6,330	10,818	13,664	774	575	24	39,276
1973	7,413	7,025	11,073	16,488	776	568	25	43,367
1972	7,805	7,824	11,384	19,635	783	559	25	48,015
1971	7,801	7,870	11,080	21,861	752	515	25	49,903
1970	7,782	7,851	10,735	23,999	721	465	23	51,576

Year	Diesel Powered by Gross Weight									
	2.0 3.5	3.5 5.0	5.0 10.0	10.0 15.0	15.0 20.0	20.0 30.0	over 30.0	Total Diesel	Total Fleet	% Change to Diesel
1985	313	3,602	9,730	19,067	8,407	12,579	1,074	54,772	75,650	2.4
1984	300	3,400	8,138	18,500	8,325	11,546	1,000	51,209	73,300	1.2
1983	301	3,350	6,849	18,438	8,343	11,195	975	49,451	74,856	1.6
1982	297	3,225	5,500	18,076	8,253	10,691	938	46,979	75,473	2.8
1981	281	2,950	4,036	16,977	7,851	9,795	865	42,755	73,195	0.6
1980	268	2,714	4,028	17,483	7,588	9,042	813	41,936	72,412	1.2
1979	250	2,406	3,930	17,627	7,184	8,151	746	40,294	70,198	0.0
1978	240	2,171	3,982	18,482	7,077	7,619	711	40,283	70,829	(0.1)
1977	230	1,915	4,047	19,467	7,006	7,128	680	40,472	71,844	3.2
1976	210	1,556	3,205	17,105	6,762	6,413	621	35,871	69,923	2.3
1975	196	1,233	2,538	15,318	6,777	5,959	587	32,608	70,667	4.0
1974	168	814	1,766	12,443	6,315	5,116	514	27,136	66,412	2.5
1973	152	448	1,198	10,511	6,334	4,693	482	23,819	67,186	2.4
1972	135	47	663	8,495	6,403	4,301	454	20,498	68,513	3.0
1971	110		139	5,976	6,151	3,704	403	16,483	66,386	2.7
1970	86			3,503	5,900	3,143	355	12,987	64,564	

electric vehicles, mainly trolleys, and gas).

The comparison shows a strong trend towards diesel power with a transfer rate of about 2 to 3 percent per year.

A9.3 Distribution by Vehicle Weight, Operator and Motive Power

A number of cross sectional surveys and official statistics are available to trace the changes in the distribution of heavy vehicles by weight, motive power and operator.

These sources include:

Road User Charges - provides fleet characteristics by motive power and gross licensed weight since 1977

Licensed Transport Statistics - apply to licensed transport operators only, available up to 1978

Certificate of Fitness Surveys - carried out by Ministry of Transport in 1972 and 1983

New Vehicle registration and sales data

Other sample surveys of the fleet

A summary of information on fleet distribution from these sources is given in Table A9.5.

Of these sources, the Road User Charges data now forms the most detailed consistent series. Comparison of successive years shows a trend towards diesel power in all weight categories, with vehicles over 15 tonnes gross weight now being almost exclusively diesel powered. The fleet has grown little in overall numbers but vehicle size has increased. These changes are illustrated in Table A9.6.

Note that the Road User Charges and Post Office figures for the total number of heavy commercial vehicles do not match. This is partly because of the inclusion in the Road User Charges data of vehicles classed as buses and miscellaneous vehicles by the Post Office but, allowing for this, there is still a discrepency, the Road User Charges figures being lower than Post Office licencing figures indicate.

In this analysis, the distribution of vehicles by gross weight and fuel type uses the Road User Charges data but Post Office licences are used for the fleet total.

The number of heavy trailers indicated in the Road User Charges data are assumed to be accurate. Trailers under 3.5 tonnes are identified as Post Office heavy trailer licences less Road User Charges trailers. A distribution of trailers by weight for recent years is given in Table A9.7.

Allocation to petrol or diesel prime mover is on the basis of the 10% of trailers which were described in 1983/84 as being petrol or diesel powered (most are correctly described as unpowered).

The heavy goods vehicle fleet is further subdivided into licensed road transport, government, local authority and ancillary categories using the Ministry of Transport 5% sample survey of certificates of fitness (1983). This replicates a similar survey carried out in 1972. The resulting distribution of the heavy vehicle fleet for 1984 is shown in Table A9.8.

A9.4 Annual Travel

Table A9.5 summarises information on annual travel available from the sources noted in A9.3 above. The data show a variation in annual travel with vehicle weight, the higher weight categories

TABLE A9.7
HEAVY TRAILERS - DISTRIBUTION BY GROSS WEIGHT
ROAD USER CHARGES STATISTICS

Gross Weight (tonnes)	% Distribution 1978/79	1979/80	1980/81	1983/84
2.0 - 3.5	0.1	0.1	0.1	0.6
3.6 - 5.0	1.8	1.6	1.4	1.6
5.1 - 10.0	27.8	26.1	24.1	21.7
10.1 - 15.0	33.1	32.5	31.0	36.2
15.1 - 20.0	27.4	28.5	29.9	27.4
20.1 - 30.0	9.8	10.5	12.7	12.4
over 30.0	0.0	0.7	0.9	0.1
All	100	100	100	100
	14760	15210	15300	12121

TABLE A9.8 HEAVY COMMERCIAL VEHICLES - NUMBERS, 1984 (000s)

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	0.50	0.10	0.60	3.00	0.10	3.10	1.40		1.40	0.40	0.10	0.50	5.30	0.30	5.60
3.5 - 5.0	0.50	0.80	1.30	0.10	2.00	2.10	0.90	0.10	1.00	0.30	0.50	0.80	1.80	3.40	5.20
5.0 - 10.0	1.60	2.50	4.10	10.00	0.10	10.10	2.40	0.80	3.20	0.90	0.60	1.50	14.90	4.00	18.90
10.0 - 15.0	1.20	5.60	6.80	2.60	9.70	12.30	1.10	0.60	1.70	0.70	0.90	1.60	5.60	16.80	22.40
15.0 - 20.0	0.30	5.00	5.30	0.50	1.90	2.40	0.10	0.40	0.50		0.30	0.30	0.90	7.60	8.50
20.0 - 30.0	0.10	8.30	8.40	0.10	2.70	2.80	0.10	0.20	0.30		0.20	0.20	0.30	11.40	11.70
over 30.0		0.70	0.70		0.30	0.30								1.00	1.00
POWERED....	4.20	23.00	27.20	16.30	16.80	33.10	6.00	2.10	8.10	2.30	2.60	4.90	28.80	44.50	73.30
Trailers:															
2.0 - 3.5	0.15	0.05	0.20	0.10		0.10	0.20		0.20	0.15	0.05	0.20	0.60	0.10	0.70
3.5 - 5.0	0.05	0.05	0.10		0.10	0.10	0.10		0.10	0.05	0.05	0.10	0.20	0.20	0.40
5.0 - 10:0	0.10	0.20	0.30	0.40		0.40	0.10		0.10	0.05	0.05	0.10	0.65	0.25	0.90
10.0 - 15.0	0.10	0.60	0.70	0.20	0.70	0.90							0.30	1.30	1.60
15.0 - 20.0	0.10	1.80	1.90	0.15	0.55	0.70							0.25	2.35	2.60
20.0 - 30.0	0.05	3.35	3.40	0.05	1.05	1.10							0.10	4.40	4.50
over 30.0		1.10	1.10		0.30	0.30								1.40	1.40
TRAILERS...	0.55	7.15	7.70	0.90	2.70	3.60	-0.40		0.40	0.25	0.15	0.40	2.10	10.00	12.10
TOTAL.....	4.75	30.15	34.90	17.20	19.50	36.70	6.40	2.10	8.50	2.55	2.75	5.30	30.90	54.50	85.40

generally showing higher annual utilisation. Within each weight category there is considerable variation in annual travel.

There is also variation with operator. The licensed transport sector shows a higher utilisation than other operator categories.

TABLE A9.9
HEAVY COMMERCIAL VEHICLE ANNUAL TRAVEL DATA

CERTIFICATE OF FITNESS SURVEY, 1983

Gross Weight (tonnes)	Annual Kilometres				
	Ancillary	Licensed	Government	Local Body	All
2.0 - 3.5	12,900	25,000	12,100	15,900	14,500
3.6 - 5.0	15,300	16,300	9,600	16,100	15,000
5.1 - 10.0	14,100	20,200	9,800	12,000	14,600
10.1 - 15.0	12,900	22,400	14,400	22,000	16,200
15.1 - 20.0	15,100	31,000	10,800	36,800	23,900
20.1 - 30.0	15,100	48,900	16,600	33,200	35,400
over 30.0	32,300	41,600			38,500
All	14,200	32,300	11,700	18,500	19,600
1972 comparison	16,100	31,200	15,200	19,700	20,500

N.Z. GOVERNMENT VEHICLE FLEET STUDY

Gross Weight (tonnes)	Annual Kilometres	
	Petrol	Diesel
2.0 - 5.0	4,800	11,000
5.1 - 7.0		15,000
7.1 - 10.0		19,800
10.1 - 15.0	11,400	8,900
over 15.0		
All	5,800	14,500

Diesel powered vehicles have a higher utilisation than petrol power within the same weight category. To some extent this is a reflection of the petrol vehicles being generally older and confined mainly to ancillary operations.

Between 1972 and 1983 the overall annual utilisation of heavy vehicles has remained relatively constant although the average annual travel of petrol and diesel powered vehicles considered separately have both reduced.

In preparing tables of annual utilisation for heavy vehicles by operator, fuel and weight, the Ministry of Transport Certificate of Fitness Survey has been used as the best estimate of average annual travel taken overall. For gross weight groups and differences between motive power the Road User Charges data

TABLE A9.10 HEAVY COMMERCIAL VEHICLES - ANNUAL TRAVEL (1984) - kms(000s)/vehicle

GROSS WEIGHT	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
tonnes	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	23.1	36.0	25.3	12.6	19.9	12.8	12.1	19.1	12.1	14.3	22.5	15.9	13.6	26.1	14.3
3.5 - 5.0	12.0	19.0	16.3	9.9	15.6	15.3	9.0	14.3	9.5	11.8	16.1	14.5	10.4	16.4	14.3
5.0 - 10.0	14.9	23.5	20.1	14.0	22.2	14.1	8.6	13.6	9.9	9.8	12.0	10.7	13.0	19.8	14.4
10.0 - 15.0	15.1	23.9	22.3	8.8	13.9	12.8	12.0	18.9	14.4	16.6	22.0	19.6	11.8	17.8	16.3
15.0 - 20.0	20.0	31.6	30.9	10.3	16.4	15.1	7.4	11.6	10.8	23.3	36.8	36.8	13.2	27.0	25.5
20.0 - 30.0	31.0	49.1	48.9	9.7	15.3	15.1	12.0	18.9	16.6	21.0	33.2	33.2	17.6	40.3	39.7
over 30.0	26.3	41.6	41.6	20.4	32.3	32.3								38.8	38.8
POWERED....	16.3	35.0	32.2	12.7	15.0	13.9	10.1	15.3	11.5	12.9	21.1	17.3	12.7	25.7	20.6
Trailers:															
2.0 - 3.5	13.5	13.5	13.5	7.5	7.5	7.5	7.5		7.5	9.5	9.5	9.5	9.5	11.5	9.8
3.5 - 5.0	12.0	12.0	12.0	11.0	11.0	11.0	6.7		6.7	10.1	10.1	10.1	8.9	11.0	10.0
5.0 - 10.0	18.5	33.5	28.5	17.0	20.0	17.0	14.0		14.0	10.0	19.0	14.5	16.2	30.6	20.2
10.0 - 15.0	19.5	33.5	31.5	12.0	20.0	18.2							14.5	26.2	24.0
15.0 - 20.0	28.0	35.0	34.6	14.0	19.0	17.9							19.6	31.3	30.1
20.0 - 30.0	36.0	36.0	36.0	13.0	18.0	17.8							24.5	31.7	31.5
over 30.0		39.0	39.0		19.0	19.0								34.7	34.7
TRAILERS...	20.0	35.6	34.5	14.1	18.6	17.5	8.9		8.9	9.7	12.9	10.9	14.2	30.7	27.8
TOTAL.....	16.8	35.2	32.7	12.8	15.5	14.3	10.1	15.3	11.3	12.6	20.7	16.8	12.8	26.6	21.6

TABLE A9.11 HEAVY COMMERCIAL VEHICLES - FUEL CONSUMPTION (1984) - litres/100km

GROSS WEIGHT	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
tonnes	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	24	16	22	24	16	24	24	16	24	24	16	22	24	16	23
3.5 - 5.0	30	20	23	30	20	20	30	20	28	30	20	23	30	20	23
5.0 - 10.0	38	25	29	38	25	37	38	25	33	38	25	32	37	25	34
10.0 - 15.0	45	30	32	44	29	31	44	29	37	44	29	34	44	29	32
15.0 - 20.0	60	40	41	57	38	41	57	38	41	57	38	38	59	40	41
20.0 - 30.0	74	49	49	69	46	47	69	46	52	69	46	46	72	49	49
over 30.0		63	63		45	60		60			60			59	59
POWERED....	40	40	40	36	31	33	35	31	33	36	30	33	37	37	37
Trailers:															
2.0 - 3.5	3	2	3	3	2	3	3	2	3	3	2	3	3	2	3
3.5 - 5.0	4	3	4	4	3	3	4	3	4	4	3	4	4	3	3
5.0 - 10.0	11	8	9	11	8	11	11	8	11	11	8	9	11	8	10
10.0 - 15.0	16	12	12	16	12	13	16	12		16	12		16	12	12
15.0 - 20.0	20	16	16	20	16	17	20	16		20	16		20	16	16
20.0 - 30.0	32	24	24	32	24	24	32	24		32	24		32	24	24
over 30.0		30	30		30	30		30			30			30	30
TRAILERS...	16	16	16	14	16	15	6		6	5	5	5	13	16	16
TOTAL.....	37	34	34	35	28	31	33	31	32	34	30	31	35	33	33

TABLE A9.12 HEAVY COMMERCIAL VEHICLES - FUEL USE (1984) - million litres

GROSS WEIGHT tonnes	LICENCED			ANCILLARY			GOVERNMENT			LOCAL AUTHORITY			ALL		
	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All	Petrol	Diesel	All
Powered Units:															
2.0 - 3.5	2.8	0.6	3.3	9.1	0.3	9.4	4.1		4.1	1.4	0.4	1.7	17.3	1.3	18.5
3.5 - 5.0	1.8	3.0	4.8	0.3	6.2	6.5	2.4	0.3	2.7	1.1	1.6	2.7	5.6	11.2	16.8
5.0 - 10.0	8.9	14.7	23.6	52.5	0.6	53.1	7.7	2.7	10.5	3.3	1.8	5.1	72.5	19.8	92.3
10.0 - 15.0	8.2	40.2	48.3	10.0	39.1	49.1	5.7	3.3	9.0	5.1	5.7	10.8	28.9	88.3	117.2
15.0 - 20.0	3.6	63.2	66.8	2.9	11.8	14.8	0.4	1.8	2.2		4.2	4.2	7.0	81.0	88.0
20.0 - 30.0	2.3	199.7	202.0	0.7	19.0	19.7	0.8	1.7	2.6		3.1	3.1	3.8	223.5	227.3
over 30.0		18.3	18.3		4.4	4.4								22.7	22.7
POWERED....	28	321	349	75	77	152	21	10	31	11	17	28	135	425	560
Trailers:															
2.0 - 3.5	0.1	0.0	0.1	0.0		0.0	0.0		0.0	0.0	0.0	0.1	0.2	0.0	0.2
3.5 - 5.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.1	0.1
5.0 - 10.0	0.2	0.5	0.7	0.7		0.7	0.2		0.2	0.1	0.1	0.1	1.2	0.6	1.8
10.0 - 15.0	0.3	2.4	2.7	0.4	1.7	2.1							0.7	4.1	4.8
15.0 - 20.0	0.6	10.1	10.6	0.4	1.7	2.1							1.0	11.8	12.7
20.0 - 30.0	0.6	28.9	29.5	0.2	4.5	4.7							0.8	33.5	34.3
over 30.0		12.9	12.9		1.7	1.7								14.6	14.6
TRAILERS...	2	42	44	2	8	10	0		0	0	0	0	4	50	54
TOTAL.....	29	363	393	77	85	162	21	10	31	11	17	28	139	475	614

have been used since they are based upon a full sample of vehicles. The Road User Charges annual utilisation is generally factored upwards to correspond with the MOT survey.

Table A9.9 shows the resulting annual utilisation assumptions for 1984 and previous years.

A9.5 Fuel Consumption

There is little direct data on unit fuel consumption of heavy commercial vehicles in New Zealand conditions. However there are now several published reports on the relationship between heavy vehicle characteristics, traffic and fuel consumption and mathematical modelling techniques for fuel use estimation. Examples from the U.K. Transport Road Research Laboratory and the World Bank Highway Design and Maintenance Standards Model are shown in Table A9.10.

These form the basis for the new fuel consumption relationships set out in Table A9.11.

TABLE A9.12 (Contd)
HEAVY VEHICLE FUEL USE - TIME SERIES, Litres

Year	Petrol	Diesel	Total
1985	139	506	646
1984	139	475	614
1983	164	464	628
1982	188	446	634
1981	204	411	615
1980	208	393	601
1979	208	368	576
1978	215	359	574
1977	224	351	575
1976	241	318	558
1975	267	296	563
1974	273	254	527
1973	299	233	532
1972	329	212	541
1971	341	182	523
1970	352	154	506

Aggregate fuel consumption estimates for heavy commercial vehicles follow as shown in Table A9.12.

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APPENDIX 10

BUS ANALYSIS

A10 BUS ANALYSIS

A10.1 Introduction

This appendix discusses data on bus fleet statistics and fuel use. A number of new data sources require that data published in ERDC Report No. 27 be amended. These data are:

- Urban Transport Council data on bus passenger loadings.
- Survey of the Government Vehicle Fleet which includes N.Z. Railways and Education Department buses.
- Census of Transport, Storage & Distribution, 1980.
- Ministry of Transport sample survey of Certificates of Fitness, 1983.

A10.2 Changes Since 1975

Some of the changes since 1975 have been:

- replacement of aging petrol buses with diesels has continued.
- trolley buses have been discontinued in Auckland.
- CNG buses are in use in Palmerston North.
- experimentation with other fuels such as LPG and alcohols has taken place in Wellington and Auckland.

The overall fleet size has not changed greatly. Some increase in bus tour operations has occurred.

A10.3 Bus Fleet Numbers

There are various data sources for bus numbers, as shown in Table A10.1.

The March quarter Post Office statistics of annual relicensing are taken as the best estimate of total vehicle numbers. However the Post

TABLE A10.1
BUS FLEET STATISTICS

POST OFFICE ANNUAL RELICENSING STATISTICS

Year	Omnibuses	Service Coaches	Total
1985	3,169	1,483	4,652
1984	3,029	1,105	4,134
1983	2,730	1,050	3,780
1982	2,452	973	3,425
1981	2,575	953	3,528
1980	2,556	841	3,397
1979	2,659	757	3,416
1978	2,622	684	3,306

CENSUS OF TRANSPORT, STORAGE AND DISTRIBUTION 1979/80

Operator	Petrol	Diesel	Other	Total
Urban Passenger Transport.....	573	852	60	1,485
Route Passenger Transport.....	463	412	38	913
School Bus Contractors.....	590	362	146	1,098
Bus Tour Operators.....	110	315	22	447
Total.....	1,736	1,941	266	3,943

Note: covers transport operators only; electric power excluded

WANGANUI COMPUTER, APRIL 1984

Body Style	Petrol	Diesel	CNG	LPG	Other	Total
Light Bus	884	31	103	6	8	1,032
Heavy Bus	6,077	2,219	146	60	155	8,657
All Bus	6,961	2,250	249	66	163	9,689

Note: includes non-transport service buses

TABLE A10.1 (Contd)
BUS FLEET STATISTICS

N.Z. RAILWAYS CORPORATION - ROAD SERVICES

March Year	Coaches	Omnibuses	Total
1985			
1984	416	324	740
1983	427	332	759
1982			
1981			
1980	422	353	775
1979	430	344	774
1978	429	348	777
1977	425	352	777
1976	415	354	769
1975	416	338	754

Source: N.Z.R. Annual Reports
Transport Statistics - Dept of Statistics

GOVERNMENT VEHICLE FLEET

Department	Buses & Coaches	
	Number	%
Defence	45	2.7
Education	698	41.2
Railways	762	45.0
Other	188	11.1
All	1,693	100

Fuel Type	Buses & Coaches	
	Number	%
Petrol	1,539	90.1
Diesel	169	9.9
Other	0	0.0
All	1,708	0

Source: "Composition of the New Zealand Government Vehicle Fleet, Part II: Final Report", Energy Consultants Ltd, for Liquid Fuels Trust Board, July 1981.

STATISTICS OF THE LICENSED ROAD TRANSPORT INDUSTRY (March 1978)

Operator/Service	Vehicles
Urban and Suburban.....	81
Medium and Long Distance.....	211
Charter and Tours.....	54
School Bus.....	195
Urban and Charter, Mixed.....	91
Urban and School, Mixed.....	57
Mixed Passenger Service.....	1,806
Other.....	15
All.....	2,510

Source: Economics Division, Ministry of Transport

CERTIFICATES OF FITNESS SURVEY, 1983

Vehicle Type	Nominal 5% Sample
Passenger Trucks	93
Service Coaches	78
Ancillary Passenger Service Vehicles	146
All	317

Source: Ministry of transport

Office classification of these statistics leads to difficulties in accurately assessing the number of buses on the road. This is primarily because buses exempt from transport licensing are classed as "goods service vehicles". These include all ancillary bus transport, that is buses carrying the owner or the owner's employees and may include some school buses (where these are not used for other transport service).

An alternative source of data is a count of vehicles by body style supplied by the Wanganui Computer Centre (April 1984). Light and heavy bus types are defined. These totals must be adjusted to allow for the time lag in purging the data files (believed to be approximately 2 years) which will tend to overstate total numbers (the excess will be mainly petrol-fuelled buses since these are the ones most likely to be replaced). A further adjustment is necessary to include passenger trucks which will be classed as goods vehicle body styles.

The adjustments for 1984 are shown in Table A10.2.

A10.4 Motive Power

Division by fuel type for buses as a whole is also best achieved using the Wanganui Computer data. It is assumed

TABLE A10.2
ANNUAL BUS TRAVEL DATA

CENSUS OF TRANSPORT, STORAGE AND DISTRIBUTION 1979/80

Operator	Annual Kms/Vehicle Engaged in Road Transport by Size of Establishment		
	Small	Large	All
Urban Passenger Transport.....	22,546	42,807	40,300
Route Passenger Transport.....	16,469	54,747	49,920
School Bus Contractors.....	19,493	22,591	20,387
Bus Tour Operators.....	18,788	48,503	41,190

Note: covers transport operators only; electric power excluded

STATISTICS OF THE LICENSED ROAD TRANSPORT INDUSTRY (March 1978)

Operator/Service	kms/Vehicle
Urban and Suburban.....	37,864
Medium and Long Distance.....	71,109
Charter and Tours.....	22,200
School Bus.....	14,015
Mixed Passenger Service.....	26,924
All.....	29,887

Note: excludes government operators

TRANSPORT STATISTICS - DEPT OF STATISTICS, 1978

Operator/Service	kms/Vehicle
Private Coach Services.....	37,137
Miscellaneous Private Passenger.....	23,419
Local Authority.....	34,622
N.Z.R. Road Services.....	37,370

OTHER DATA

Operator/Service	kms/Vehicle	Source
N.Z.R. Route Bus.....	47,480	NZERDC Report No. 27
N.Z.R. Urban/Suburban Bus.....	43,690	NZERDC Report No. 27
N.Z.R. All Buses and Coaches.....	53,111	Government Vehicle Fleet Study
Education Dept. School Buses.....	13,420	Pers. Comm. Education Department
Education Dept. School Buses.....	13,910	Government Vehicle Fleet Study

TABLE A10.2
ADJUSTMENTS TO WANGANUI COMPUTER DATA

	Light Buses <= 9 seats	Heavy Buses > 9 seats
Wanganui Computer total	1,032	8,657
less 2 yrs deletions	-82	-357
	950	8,300
add passenger trucks	195	1,137
Adjusted Total	1,145	9,437

TABLE A10.3
DIVISION BY MOTIVE POWER

	Light Buses	Heavy Buses
Petrol.....	987	6,704
Diesel.....	47	2,396
CNG.....	104	147
LPG.....	6	60
Electric.....		125
Total	1,144	9,432

TABLE A10.4
ANNUAL BUS TRAVEL DATA

CENSUS OF TRANSPORT, STORAGE AND DISTRIBUTION 1979/80

Operator	Annual Kms/Vehicle Engaged in Road Transport by Size of Establishment		
	Small	Large	All
Urban Passenger Transport.....	22,546	42,807	40,300
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Note: excludes government operators

TRANSPORT STATISTICS - DEPT OF STATISTICS, 1978

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N.Z.R. All Buses and Coaches.....	53,111	Government Vehicle Fleet Study
Education Dept. School Buses.....	13,420	Pers. Comm. Education Department
Education Dept. School Buses.....	13,910	Government Vehicle Fleet Study

that vehicles deleted from the fleet are petrol powered and that passenger trucks are 50% petrol and 50% diesel powered.

The division of buses by motive power is then as shown in Table A10.3.

A10.5 Annual Travel

A number of data sources on bus utilisation are summarised in Table A10.4.

The various data sources are reasonably consistent, except that the Government Vehicle Fleet Study reports a higher annual mileage for NZR Road Services buses than previous information direct from NZR in 1976.

Unfortunately, the "Transport Statistics" and "Statistics of the Licenced Road Transport Industry" respectively do not detail bus operations or are not available post 1978.

These have been used in preparing Table A10.5.

There is a tendency for diesel vehicles to higher annual mileage than petrol vehicles. This is because the higher capital cost of diesel suits it to more intensive use and because annual travel declines with age; and petrol buses in the heavier weight classes tend to be old vehicles. In the anciallry category, most of the vehicles are petrol-fuelled and are generally smaller vehicles.

Total vehicle kilometres of travel (VKT) follows from fleet size and annual utilisation, as shown in Table A10.6.

Total VKT may be broken down by type of service. The breakdown of local authority bus operations into type of service follows NZERDC Report No. 27 which was derived from a survey undertaken in 1974:

	% of Travel
Urban	94
Route	-
Charter	5
Schhool	1
Other	-
	100

Private operator mileage in urban/suburban transport operations (from MOT data 1979) was 14.4 million vehicle-kms, or 31% of total travel which is somewhat less than set out in NZERDC Report 27. These services are estimated to involve about 500 buses at an average of 26,400 km/year.

Information from the Education Department (1979) shows the use of buses for school travel:

	Million km
Contract services	24.92
Education Dept.	10.75
NZR Road Services	3.27
Other allowances/taxis	4.69
	43.63

TABLE A10.5
BUSES - ANNUAL TRAVEL BY OPERATOR AND FUEL TYPE (1984) - kms/vehi

OPERATOR	PETROL	DIESEL	CNG	ELECTRIC	ALL
Local Authority	32,000	37,700	28,000	22,000	35,588
Private:					
- urban/suburban	40,300	40,300			40,300
- route	48,000	52,000			48,889
- charter/tour	41,200	41,200			41,200
- school	18,500	22,500			20,136
Private	32,984	33,775			33,294
N.Z.R. Road Services					
- urban/suburban	51,900	51,900			51,900
- route	56,500	56,500			56,500
N.Z.R.	53,111	55,895			54,503
Education Dept	14,000				14,000
Transport services	30,882	38,930	28,000	22,000	34,348
Ancillary vehicles	20,000	20,000	20,000		
All	23,904	38,182	20,750	22,000	27,201

TABLE A10.6
BUSES - TRAVEL VOLUME BY OPERATOR AND FUEL TYPE (1984), Bus-kms (10^6)

OPERATOR	PETROL	DIESEL	CNG	ELECTRIC	ALL
Local Authority	3.2	39.6	0.8	2.6	46.3
Private:					
- urban/suburban	16.1	4.0			20.2
- route	16.8	5.2			22.0
- charter/tour	6.2	14.4			20.6
- school	12.0	10.1			22.2
Private	51.1	33.8			84.9
N.Z.R. Road Services					
- urban/suburban	14.5	2.6			17.1
- route	5.7	18.6			24.3
N.Z.R.	20.2	21.2			41.4
Education Dept	9.8				9.8
Transport services	84.3	94.6	0.8	2.6	182.4
Ancillary vehicles	97.6	2.0	5.8		105.4
All	181.9	96.6	6.6	2.6	287.8

The contract services can be apportioned as follows:

School bus contractors	19.4
Local authorities	0.5
Private operators	5.0
	24.9

A10.6 Bus Loading

More data is now available for operators of urban services as follows:

Operator	Average Passengers
Local authority	12.0
Large private operators	14.0
Airport buses	6.0
Medium/small private operators	9.8
(source MOT)	

Changes in passengers carried per kilometre run are available in some

TABLE A10.7
BUS PASSENGER LOADINGS

Year	Passengers/Kilometre Run		
	Private Coach Services	Local Authority	NZR Road Services
1970	0.81	3.17	0.57
1975	N/A	2.36	0.49
1978	N/A	2.14	0.47
1981/1985 loading	0.9	0.88	0.94

cases up to 1978. These are shown in Table A10.7.

A slow decline in patronage is indicated. It is believed that this decline has since levelled off.

The last column in the table is a reduction factor applied to the 1975 estimates of bus loading.

A10.7 Fuel Consumption

There are no new data that require alteration of the unit fuel consumption figures previously reported. An exception is a slight change to NZR Road Services for which total fuel use data have been provided.

Tables A10.8 and A10.9 summarise the fuel consumption and total fuel use attributable to buses.

TABLE A10.8
BUSES - FUEL CONSUMPTION BY OPERATOR AND FUEL TYPE (1984)

OPERATOR	PETROL 1/100km	DIESEL 1/100km	CNG GJ/100km	ELECTRIC GJ/100km
Local Authority	46	37	1.5	1.0
Private:				
- urban/suburban	46	35		
- route	38			
- charter/tour	38	28		
- school	29	30		
Private				
N.Z.R. Road Services				
- urban/suburban	55			
- route	42	32		
N.Z.R.				
Education Dept	29			
Transport services				
Ancillary vehicles	20	15		
All				

TABLE A10.9
BUSES - FUEL USE BY OPERATOR AND FUEL TYPE (1984)

OPERATOR	PETROL millio litres	DIESEL million litres	CNG GJ	ELECTRIC GJ	TOTAL PJ
Local Authority	1.5	14.6	0.01	0.03	0.58
Private:					0.00
- urban/suburban	7.4	1.4	0.0	0.0	0.29
- route	6.4	0.0			0.21
- charter/tour	2.3	4.0			0.22
- school	3.5	3.0			0.22
Private	19.6	8.5	0.0	0.0	0.94
					0.00
N.Z.R. Road Services					0.00
- urban/suburban	8.0	0.0			0.26
- route	2.4	6.0			0.29
N.Z.R.	10.4	6.0	0.0	0.0	0.55
					0.00
Education Dept	2.8	0.0			0.09
Transport services	34.3	29.1	0.01	0.03	2.16
Ancillary vehicles	19.5	0.3	0.0		0.64
All - units as above	53.8	29.4	0.01	0.03	2.80
- PJ	1.74	1.06	0.00	0.00	2.80

TABLE A10.9 (Contd)
HEAVY BUS NUMBERS AND FUEL USE - TIME SERIES

Year	Bus Numbers					Fuel Consumption				
	Petrol	Diesel	CNG/LPG	Electric	Total	Petrol Litres (10^6)	Diesel Litres (10^6)	CNG/LPG GJ	Electric GJ	Total PJ
1985	2,520	3,030	240	110	5,900	32.5	36.1	0.0	0.0	2.35
1984	2,660	2,440	200	110	5,300	34.3	29.1	0.0	0.0	2.16
1983	2,680	2,350	160	110	5,300	34.6	28.0	0.0	0.0	2.13
1982	2,700	2,370	120	110	5,300	34.8	28.3	0.0	0.0	2.15
1981	2,720	2,390	80	110	5,300	35.1	28.5	0.0	0.0	2.16
1980	2,740	2,310	40	110	5,200	35.3	27.5	0.0	0.0	2.14
1979	2,750	2,220	0	130	5,100	35.5	26.5	0.0	0.0	2.10
1978	2,770	2,070		160	5,000	35.7	24.7	0.0	0.0	2.05
1977	2,790	1,910		200	4,900	36.0	22.8	0.0	0.0	1.99
1976	2,810	1,770		220	4,800	36.2	21.1	0.0	0.1	1.93
1975	2,830	1,620		250	4,700	36.5	19.3	0.0	0.1	1.88
1974	2,850	1,490		260	4,600	36.8	17.8	0.0	0.1	1.83
1973	2,870	1,450		280	4,600	37.0	17.3	0.0	0.1	1.82
1972	2,890	1,425		285	4,600	37.3	17.0	0.0	0.1	1.82
1971	2,910	1,500		290	4,700	37.5	17.9	0.0	0.1	1.86
1970	2,920	1,980		300	5,200	37.7	23.6	0.0	0.1	2.07

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APPENDIX 11

TAXI AND RENTAL VEHICLE ANALYSIS

A11 TAXI AND RENTAL VEHICLE ANALYSIS

This appendix discusses the data available on taxis and rental vehicles.

A11.1 Post Office Licensing Statistics

These identify public and private taxicabs and rental cars. The numbers of taxis have not varied greatly over the last 10 years, standing at around 3,000 vehicles. Rental cars have grown from 5,300 in 1975 to 7,400 in 1984.

Abstracts of the Post Office licencing statistics are given in Table A11.1

Rental trucks (including caravans) are not separately identified in the statistics, being included with "Goods Service Vehicles".

A11.2 Census of Transport, Storage and Distribution, 1979-80

Information obtained in this census is shown in Table A11.2.

These statistics indicate fewer vehicles than Post Office licencing and are probably incomplete. However, the distribution of types of vehicle and fuel are useful.

TABLE A11.1
TAXI AND RENTAL CARS - POST OFFICE RELICENSING STATISTICS

YEAR	RENTAL CARS	TAXIS		
		PRIVATE	PUBLIC	TOTAL
1985	10,117	374	2,582	2,956
1984	7,395	399	2,620	3,019
1983	7,133	223	2,669	2,892
1982	6,247	265	2,852	3,117
1981	6,127	174	2,996	3,170
1980	5,945	119	3,015	3,134
1979	5,484	114	2,951	3,065
1978	5,533	84	2,987	3,071
1977	5,899	101	3,084	3,185
1976	5,425	130	3,082	3,212
1975	5,279	132	3,113	3,245
1974	5,038	99	3,046	3,145
1973	4,197	129	2,993	3,122
1972	4,007	129	2,937	3,066
1971	3,661	159	2,918	3,077
1970	3,222	157	2,891	3,048

TABLE A11.2
CENSUS OF TRANSPORT, STORAGE AND DISTRIBUTION 1979/80
TAXI AND RENTAL VEHICLE DATA

Operator	Vehicles			
	Petrol	Diesel	LPG/CNG	Total
TAXICAB OPERATORS:				
Cars.....	2,280	57	325	2,662
Light Commercial Vehicles..	5			5
Heavy Commercial Vehicles..	2	1		3
Buses.....	2			2
Other Powered Vehicles.....	3			3
	2,292	58	325	2,675
RENTAL VEHICLE OPERATORS:				
Cars.....	4,876			4,876
Light Commercial Vehicles..	707	19		726
Heavy Commercial Vehicles..	122	17		139
Buses.....	20			20
Other Powered Vehicles.....	87	44		131
	5,812	80	0	5,892

Annual vehicle mileage from this census showed:

Rental vehicles	26,130km/year
Taxis	58,630km/year

A11.3 Statistics of the Licensed Road Transport Industry

Enquiries of the Ministry of Transport in 1979 provided the following breakdown of rental vehicles (December 1978 figures)

RENTAL VEHICLE 1978

Cars	6,399
Station wagons	399
Vans	219
Trucks	1,259
Omnibuses	11
Caravans	16
Motorcycles	69
Service vehicles	123
Total	8,495

Kilometres/vehicle = 24,600

The offical bulletins give data on taxi and rental vehicles which is reproduced in Table A11.3.

A more detailed breakdown for 1978 shows various classes of taxi operations. Annual travel and fuel cost is shown in Table A11.4.

A11.4 Reconciliation of Statistics

The MOT figures are used as the most accurate totals of vehicles in these categories. They show a higher number of rental cars than shown in the Post Office statistics.

The Census of Transport in conjunction with MOT information is used to classify vehicles into body type and fuel type with the exception that a greater number of taxis are now known to be gas powered. We have assumed that by the end of 1983, taxis in North Island centres on the natural gas pipeline used CNG or LPG exclusively. The MOT Annual Report for 1983 shows approximately 1,400 such taxis. It is assumed that the Census of Transport figure is accurate for 1979, given a correction factor for under-reporting of 1.08.

The resulting distribution of motive power for recent years is shown in Table A11.5.

Annual utilisation for taxis and rental vehicles has been assumed to remain constant at:

taxis : 60,000 kilometres/year

rental : 22,000 kilometres/year

Fuel consumption rates for taxis are assumed to be 15 litres/100 km, that is an improvement upon 1978 inferred fuel consumption allowing for some

TABLE A11.3
STATISTICS OF THE LICENSED ROAD TRANSPORT INDUSTRY

Year	Taxi Operators		Rental Operators	
	Vehicle Authorities	Kilometres/ Vehicle	Vehicle Authorities	Kilometres/ Vehicle
1985				
1984	2,657			
1983	2,817			
1982	2,917		10,384	
1981	2,939		8,925	
1980	2,890		9,057	
1979	2,876		8,941	
1978	2,939		8,945	
1977	2,982		8,400	
1976	2,992	56,000	8,153	22,000
1975	3,010	61,000	7,373	22,000
1974	2,999	63,000	7,213	22,000
1973	2,953	62,000	6,585	21,000
1972	2,935	64,000	6,111	22,000
1971	2,946		5,783	

Note: Data for 1971 to 1975 are from the "Statistics of the Licensed Road Transport Industry" , Bulletin No.9, Ministry of Transport. Figures for 1978 onwards are from MOT Annual Reports.

TABLE A11.4
STATISTICS OF THE LICENSED ROAD TRANSPORT INDUSTRY
TAXI OPERATORS, 1978 DATA

	Number of Vehicles	Annual Kilometres	Cents/km Fuel Cost	Inferred Litres/100km
Rural taxis.....	56	44,571	4.93	17.2
Metropolitan taxis...	944	48,744	5.06	17.6
Other taxis.....	1,011	55,743	4.77	16.6
Private hire.....	26	19,307	5.16	18.0
Taxis and private hir	2,037	51,727	4.91	17.1

Note: petrol price 28.7 cents/litre retail

Source: Economics Division, Ministry of Transport

TABLE A11.5
TAXI AND RENTAL VEHICLE FLEET, 1981

Vehicle Type and Operator	Vehicles			
	Petrol	Diesel	LPG/CNG	Total
TAXI OPERATORS:				
Cars (1).....	2,000	60	880	2,940
RENTAL OPERATORS:				
Cars.....	7,870			7,870
Light Commercial Vehicles....	1,180	30		1,210
Heavy Commercial Vehicles....	210	20		230
Buses.....	20			20
Motorcycles.....	70			70
Caravans.....	20			20
Rental Vehicles.....	9,370	50	0	9,420
Support Vehicles.....	110	30		140
Taxi and Rental Vehicles	11,480	140	880	12,500

Note: (1) plus about 15 support vehicles

Source: various sources - see text

TABLE A11.5 (Contd)
TAXI AND RENTAL VEHICLE FLEET - TIME SERIES

Year	Taxis				Rental Vehicles				
	Petrol	Diesel	CNG/LPG	All	Cars	Light CV	Heavy CV	Other	All
1985	622	60	1,920	2,602	14,050	2,160	411	2,767	16,817
1984	937	60	1,660	2,657	10,270	1,579	300	2,023	12,292
1983	1,327	60	1,400	2,787	9,906	1,523	289	1,951	11,857
1982	1,717	60	1,140	2,917	8,675	1,334	254	1,709	10,384
1981	1,999	60	880	2,939	7,456	1,146	218	1,469	8,925
1980	2,220	60	610	2,890	7,567	1,163	221	1,490	9,057
1979	2,466	60	350	2,876	7,470	1,148	218	1,471	8,941
1978	2,879	60		2,939	7,473	1,149	218	1,472	8,945
1977	2,906	60		2,966	7,142	1,098	209	1,407	8,549
1976	2,932	60		2,992	6,811	1,047	199	1,342	8,153
1975	2,950	60		3,010	6,160	947	180	1,213	7,373
1974	2,939	60		2,999	6,026	927	176	1,187	7,213

downsizing and improved fuel economy of later models. Equivalent rates for gas powered vehicles are used.

For rental vehicles, fuel consumption rates as for business cars and light commercial vehicles have been used.

The resulting fuel utilisation analysis for taxis and rental vehicles is shown in Table A11.6.

TABLE A11.6
TAXIS AND RENTAL VEHICLES
ESTIMATED FUEL CONSUMPTION, 1981

Vehicle Type and Operator	Number	Fuel Type	Annual Kms	Litres (cu m) /100 kms	Litres (cu m) (10^6)	Litres Petrol Substituted (10^6)
TAXI OPERATORS:						
[	2,000	Petrol	58,630	17.1	20.1	20.1
Cars ...[	60	Diesel	58,630	12.8	0.5	0.5
[	440	LPG	58,630	21.4	5.5	4.4
[	440	CNG	58,630	12.8	3.3	4.4
Total.....	2,940					29.3
RENTAL OPERATORS:						
Cars.....	7,870	Petrol	26,130	12.0	24.7	24.7
Light CVs....	1,180	Petrol	26,130	12.0	3.7	3.7
	30	Diesel	26,130	12.0	0.1	0.1
Heavy CVs....	210	Petrol	26,130	20.0	1.1	1.1
	20	Diesel	26,130	15.0	0.1	0.1
Buses.....	20	Petrol	26,130	15.0	0.1	0.1
Motorcycles..	70	Petrol	26,130	5.0	0.1	0.1
Caravans.....	20	Petrol	26,130	15.0	0.1	0.1
Support Vehs.	110	Petrol	26,130	12.0	0.3	0.3
	30	Diesel	26,130	15.0	0.1	0.2
Total.....	9,560				30.4	30.5
Total	11,480	Petrol			19.8	50.1
	140	Diesel			0.7	0.8
	440	LPG			5.5	4.4
	440	CNG			3.3	4.4
	12,500					59.8

ESTIMATED FUEL CONSUMPTION - TIME SERIES (10^6 Litres or Cu m)

Year	Taxis				Rental Vehicles				
	Petrol	Diesel	CNG (cu m)	LPG	Cars	Light CV	Heavy CV	Other	All
1985	6.2	0.5	12.0	7.2	40.7	6.3	1.9	1.2	50.1
1984	9.4	20.1	37.9	6.2	29.8	4.6	1.4	0.9	36.6
1983	13.3	20.1	32.0	5.3	28.7	4.4	1.4	0.8	35.3
1982	17.3	20.1	26.0	4.3	25.2	3.9	1.2	0.7	31.0
1981	20.1	20.1	20.1	3.3	24.7	3.8	1.2	0.7	30.4
1980	22.3	20.1	13.9	2.3	23.9	3.7	1.1	0.7	29.5
1979	24.8	20.1	8.0	1.3	22.1	3.4	1.1	0.6	27.2
1978	28.9	20.1	0.0	0.0	22.3	3.4	1.1	0.6	27.4
1977	29.2	20.1	0.0	0.0	23.8	3.7	1.1	0.7	29.2
1976	29.5	20.1	0.0	0.0	21.8	3.4	1.0	0.6	26.9
1975	29.7	20.1	0.0	0.0	21.3	3.3	1.0	0.6	26.2
1974	29.6	20.1	0.0	0.0	20.3	3.1	1.0	0.6	25.0

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APPENDIX 12

TWO-WHEEL VEHICLES

A12 TWO WHEEL VEHICLES

Two wheelers comprise:

Motorcycles - all two wheel powered vehicles unless equipped with pedals and less than 2 kW.

Mopeds (old powercycles) - all vehicles equipped with pedals and all those with a motor not exceeding 2 kW.

Bicycles - unpowered two wheelers.

TABLE A12.1
MOTORCYCLES AND MOPEDS - POST OFFICE LICENCES

Year	Motorcycles	Mopeds	Total On-Road
1985	137,442	1,441	138,883
1984	141,156	1,379	142,535
1983	143,894	1,479	145,373
1982	144,327	1,591	145,918
1981	136,722	1,748	138,470
1980	123,071	2,001	125,072
1979	104,570	1,890	106,460
1978	103,712	2,103	105,815
1977	104,147	2,879	107,026
1976	98,833	4,207	103,040
1975	66,815	26,841	93,656
1974	60,493	26,655	87,148
1973	47,476	24,950	72,426
1972	39,326	23,614	62,940
1971	32,099	20,974	53,073
1970	29,176	18,826	48,002

A12.1 Fleet size and Ownership

Post Office licensing statistics for motorcycles and mopeds are shown in Table A12.1.

There has been a much higher growth rate in motorcycle registrations than in other vehicles, over the last 10 years. An average compound growth rate of 5.7% has added 55% to the fleet.

From Appendix A5 there are approximately 19,000 exempt farm bikes and an estimated 19,000 further unregistered bikes used entirely off-road.

These have been included in the estimates shown in Table A12.1.

Table A12.2 shows the holdings of motorcycles recorded by the 1981 Population Census as a minimum of 173,600. This may include motorcycles temporarily off the road in the case of households but will not include used motorcycles in dealer's stocks (estimated at 2% of the total onroad fleet, say 2,500).

A 100% sample of the Post Office multiple relicencing register (but excluding local authorities) obtained by En-Consult Technology Ltd (1984) showed a ratio between motorcycle holdings and holdings of business cars of 1:9.

TABLE A12.2
1981 CENSUS - HOLDINGS OF MOTORCYCLES, MOPEDS AND BICYCLES

Vehicles Held	Percent of Households			
	Main Urban Areas	Other Urban Areas	Rural Areas	All Areas
MOTORCYCLES:				
none	41.57	36.20	23.25	38.05
1	9.31	11.32	22.36	11.53
2 or more	1.92	2.24	8.23	2.89
unspecified	47.20	50.25	46.16	47.53
	100	100	100	100
Total ('000s)	91.7	25.25	56.69	173.64
MOPEDS AND BICYCLES:				
none	30.08	24.78	21.35	27.97
1	14.27	15.62	12.21	14.19
2 or more	19.5	23.31	19.38	20.09
unspecified	36.14	36.29	47.06	37.76
	100	100	100	100
Total ('000s)	371.4	99.5	74.4	545.3
Deduct mopeds				1.7
Bicycles				543.6

Source: Census of Population and Dwellings, 1981

This sample included a number of larger farms and is applicable to fleets of more than five vehicles. This implies a motorcycle holding by other than households (excluding farms) of about 10,000.

A12.2 Annual travel and Fuel Consumption

There is relatively little data on annual travel by two wheel vehicles. The 1977 Ministry of Transport Driver Exposure Survey indicated that some 400 million kilometres were travelled by motorcycle on road per year in 1977. This implies an annual travel per vehicle of some 4,000 kilometres/year. This is somewhat less than previously estimated in ERDC Report 27. The fuel consumption of motorcycles is assumed to be 5 litres/100 kilometres.

The resulting estimates of fuel use by two wheel vehicles is given in Table A12.3.

TABLE A12.3
ESTIMATE OF FUEL USE BY TWO WHEEL VEHICLES, 1984

Vehicle	Number	Annual Kilometres	Litres/ 100 kms	Litres (10^6)
MOTORCYCLES:				
Non-farm:	141,200	4,000	5	28.2
Farm Bikes:				
on-road	38,000	400	5	0.8
off-road		2,200	7.5	6.3
	179,200	6,600		35.3
MOPEDS:	1,400	2,000	2	0.1
TOTAL	180,600			35.3

ESTIMATE OF FUEL USE BY TWO-WHEEL VEHICLES - TIME SERIES

Year	On-Road	Off-Road	Total
1985	28.3	8.5	36.8
1984	29.1	6.3	35.3
1983	29.6	8.0	37.6
1982	29.7	7.7	37.4
1981	28.1	7.4	35.6
1980	25.3	7.2	32.5
1979	21.5	6.8	28.3
1978	21.3	6.4	27.8
1977	21.4	6.0	27.5
1976	20.3	5.7	26.0
1975	13.8	5.3	19.0
1974	12.5	4.9	17.4
1973	9.8	4.5	14.3
1972	8.1	4.1	12.2
1971	6.6	3.7	10.3
1970	6.0	3.3	9.3

Source: Off-road from Appendix A5

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APPENDIX 13

GOVERNMENT AND LOCAL AUTHORITIES

A13 GOVERNMENT AND LOCAL AUTHORITIES

This appendix reviews the available information on local authority and Central Government vehicle holdings and use of fuel.

A13.1 Survey of the Government Vehicle Fleet

This survey, by Energy Consultants Ltd (1981) for the Liquid Fuels Trust Board, covered a 90% sample of Government vehicles but did not extend to regional organisations (such as Hospital Boards); although divisional offices of Central Government departments were covered.

Table A13.1 shows the results of this survey in terms of vehicle number by body style and motive power.

The survey apparently extends to all transport vehicles but it is not clear how far mobile machines, on or off-road, are included.

Certain departments are not represented, viz:

Audit Office
Crown Law Office
Customs
Energy (other than NZE and Mines)
Environment
Foreign Affairs
Government Life Insurance
Government Printing Office
Housing Corporation

A13.2 Local Authorities

Local authorities were covered in a survey by En-Consult Technology Ltd (1984) on a sample basis. Some characteristics of vehicle holdings are shown in Table A13.2. The territorial local authority figures are for general administrative services and exclude special purpose activities such as power, water supply and transport services. These are covered under their respective NZSIC categories of "electric power authorities" and "water boards, etc." Transport, generally bus services and back up, vehicles are dealt with is Appendix A10.

A13.3 Allocation to NZSIC Categories

Central Government operating departments are allocated to NZSIC categories as shown in Table A13.3.

Local authorities are assigned as follows:

	NZSIC
Power, gas and water boards	4101
Territorial local authorities	9102
Harbour Boards	71231
Pest destruction boards	11320-9

A13.4 Annual Travel and Fuel Consumption

For Government vehicles, annual travel by vehicle type is obtained from Table 4.4 in the Government Vehicle Fleet Study (Energy Consultants Ltd, 1981) as follows:

	kms/year
Cars	18,830
Light CVs	15,260
Trucks, 2-5 tonnes	14,365
Trucks over 5 tonnes	13,720
Buses	32,250
Other vehicles	16,115

The distribution of cars and light commercials by engine size is available from Table 4.3 in the same study reproduced here as Table A13.4. Fuel consumption has been related to engine size using the relationship used for business vehicles.

The resulting analysis of fuel consumption in central and local government fleet vehicles is shown in Table A13.5.

TABLE A13.1

GOVERNMENT VEHICLE FLEET COMPOSITION

Department	NZSIC	Cars	Light CVs	Heavy CVs	Buses	Other	Total
Agriculture and Fisheries	9101	604	100	280	11	1	996
Defence	9101	280	52	428	45	16	821
DSIR	9320	76	9	100	3		188
Education	9101	77	1	18	698	1	795
N.Z. Electricity	4101	354	203	1,060	22	29	1,668
N.Z. Forest Service	12	211	294	1,032	4	24	1,565
Health	9101	609	11	19	1		640
Inland Revenue	9101	21		2			23
Internal Affairs	9101	13	30	43	1		87
Justice	9399	76	8	127	21	1	233
Labour	9101	171	8	30	2		211
Maori Affairs	9101	212	9	50			271
Mines	2100	48	3	87			138
Police	9101	751	5	96		12	864
Post Office	7200	1,934	855	3,298	4		6,091
N.Z. Railways	7111	66	16	187	762	62	1,093
Social Welfare	9101	260	1	33	1		295
State Insurance	8200	142		4			146
Transport	9101	772	5	76		50	903
Works and Development	5	750	788	1,514	6	19	3,077
Tourism and Publicity	9101	24	2	6		1	33
Total		7,451	2,400	8,490	1,581	216	20,138
Total , Administration	9101	3,794	224	1,081	759	81	5,939
Total, Operational	other	3,657	2,176	7,409	822	135	14,199

TABLE A13.1 (Contd)

GOVERNMENT VEHICLE FLEET COMPOSITION

Department	NZSIC	Petrol	Diesel	Alcohol/CNG/LPG Blend		Total
Agriculture and Fisheries	9109	996	1			997
Defence	9101	821	22			843
DSIR	9320	188	3	1	1	193
Education	9101	795	1			796
N.Z. Electricity	4101	1,668	39			1,707
N.Z. Forest Service	12	1,565	158			1,723
Health	9101	640				640
Inland Revenue	9101	23				23
Internal Affairs	9101	87	1			88
Justice	9399	232	4			236
Labour	9101	211				211
Maori Affairs	9101	271				271
Mines	2100	138	12			150
Police	9101	864				864
Post Office	7200	6,091	5	45	1	6,142
N.Z. Railways	7111	1,093	223			1,316
Social Welfare	9101	295	1			296
State Insurance	8200	146				146
Transport	9101	903	21			924
Works and Development	5	3,077	383			3,460
Tourism and Publicity	9101	33				33
Total		20,137	874	46	2	21,059
Total , Administration	9101	20,137	874	46	2	21,059
Total, Operational	other	14,198	827	46	2	15,073

Source: Energy Use in the Government Vehicle Fleet, by Energy Consultants Ltd, 1981, for the Liquid Fuels Trust Board.

TABLE A13.2
LOCAL BODIES - PETROL VEHICLE HOLDINGS, 1982

Type of Authority	Employees per Vehicle	Employees per Authority	Vehicles per Authority	Number Sampled	Fleet Composition %			
					Cars	Light CVs	Heavy CVs	Other
County Councils.....	1.8	62	34	15	21	56	22	1
Urban Boroughs.....	3.1	54	17	4	20	42	37	1
Other Boroughs.....	3.4	36	11	10	19	49	26	6
City Councils.....	8.3	1394	168	5	28	39	33	
Hospital Boards.....			179	3	72	14	15	
Harbour Boards.....	11.2	562	50	4	32	45	20	3
Electric Power Boards.....	2.7	234	87	8	33	39	28	
Water Boards.....	2.2	71	32	4	41	41	17	1
Pest Destruction,Hydatids etc			7	6	2	92	4	
Regional Authorities.....								
Miscellaneous.....								

Type of Authority	Number of Establishments	Number of Employees	Petrol Vehicles				
			Cars	Light CVs	Heavy CVs	Other	Total
County Councils.....	104		486	1,294	509	23	2,312
Urban Councils.....	141		1,383	2,684	1,982	144	6,193
Harbour Boards.....	20		125	176	78	12	391
Electric Power Boards.....	40		91	108	78		277
Water Boards.....	45		132	132	55	3	322
Pest Destruction, Hydatids etc..		760	8	276	16		300
Regional Authorities.....		2,313	58	126	93	20	297
Miscellaneous.....		5,588	383	805	472	34	1,694
Total.....			2,666	5,601	3,283	236	11,786

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APPENDIX 14

CNG AND LPG VEHICLES

A14 CNG AND LPG VEHICLES

A14.1 Introduction

This appendix discusses the available data on the LPG and CNG vehicle fleet. Vehicle numbers are estimated from kit sales or installation certificates with the distribution by vehicle type and sector from other official statistics and various sample surveys.

Because the numbers of vehicles on gas fuel is changing rapidly it is also important to take note of the exact date of the various surveys.

A14.2 Histories of Kit Sales and Installation Certificates

The history of CNG vehicle kit sales is well recorded. Table 14.1 shows calendar year totals from official statistics. At the end of 1984, 80749 kits had been sold. In its CNG Market Development Study, NZERDC reported that the number of installation certificates stood at 45,678 in July 1984, which was 79% of kit sales. however there is a lag in returning installation certificates while other kits are held in stock and a few destroyed. If the difference is assumed to correspond to a 3 month lag, the kit sales statistics can be approximated to on-road vehicles as shown in Table 14.2.

LPG kit sales (Table 14.3) have shown a much slower rate of growth compared to CNG up to 1983. However, a more advantageous price differential for LPG against petrol which developed in 1984 coupled with an improvement in the supply position has led to a remarkable surge in sales which resulted in almost three times the number of LPG cumulative sales by the end of 1984 compared with one year earlier.

TABLE A14.1
CNG KIT SALES

Year	Annual Sales	Cumulative Sales	% Annual Growth
1979	1,627	1,627	
1980	4,742	6,369	291
1981	10,494	16,863	165
1982	15,572	32,435	92
1983	19,035	51,470	59
1984	29,279	80,749	57
1985			

Source: Ministry of Energy, Energy Data File

A14.3 Distribution of CNG and LPG Vehicles (Tables A14.4 to A14.6)

Gas conversions are prevelant among taxis and other high utilisation vehicles. April 1984 data from the Wanganui Computer showed the following distribution of gas-powered vehicles by body style.

TABLE A14.2
ESTIMATED ON-ROAD CNG VEHICLES

Year	At Year End	Year Average	CNG Sales (PJ)	GJ/Vehicle
1979	1,000	700	NA	NA
1980	4,000	3,000	NA	NA
1981	15,000	11,300	NA	NA
1982	26,000	20,500	1.17	57.1
1983	46,000	39,300	2.57	65.4
1984	70,000	62,000	4.04	65.2
1985				

Note: year average vehicles are distance-weighted

Source: Ministry of Energy, Energy Data File

TABLE A14.3
LPG KIT SALES

Period	Periodic Sales	Cumulative Sales	Yearly Average	% Annual Growth
Dec-81	NA	4,409		NA
Dec-82	779	5,188	4,669	15
Dec-83	2,038	7,226	5,867	28
Jul-84	2,923	10,149		
Dec-84	10,188	20,337	11,965	64
Mar-85	6,737	27,074		

Vehicle	CNG No.	CNG %	LPG No.	LPG %
Cars	27,922	64	4,799	60
Light Commercials	12,363	29	1,951	24
Heavy Commercials	2,174	5	579	7
Other	877	2	685	9
	43,336	100	8,014	100

(Note: unspecified "gas" power has been redistributed to LPG and CNG. "Other" truck body styles redistributed to light and heavy commercial)

Most of the "other" category is made up, in the case of LPG, of mobile machines, mainly fork lift trucks; for CNG the other category are mainly unspecified body styles and should be redistributed.

TABLE A14.4
DISTRIBUTION OF CNG VEHICLES

Region	Percent of Loans	Ownership	Percent of Loans	Number of Loans
Auckland	49.5	Private	54	37,800
Wellington	13.2	Business	32	22,400
Hamilton	10.0	Public Body	14	9,800
P.North	3.3			
Other	21.6			70,000
Unknown	2.4			
	100.0			

Source: CNG Market Study, NZERDC 1985

DISTRIBUTION OF CNG VEHICLES

Industry Sector	Percent of Loans	Number of Loans
Farming	4.6	1500
Other Primary Industry	0.5	200
Food Manufacture	5.1	1600
Other Manufacture	23.6	7600
Electricity,Water & Gas	2.3	700
Building & Construction	16.7	5400
Taxis	7.9	2500
Road Freight	2.8	900
Other Transport	0.9	300
Post Office, Telecoms	3.2	1000
Wholesale Trade	6	1900
Retail Trade, Hotels	8.9	2900
Finance,Insurance	4.6	1500
Business, Prof. Services	9.8	3200
Community & Social Servs.	2.3	700
Local Government	0.4	100
Central Government	0.4	100
	100	32200

Source: CNG Market Study, NZERDC 1985

Responses to the CNG Market Study give a further insight to the distribution of CNG vehicles. The geographic distribution largely follows the general distribution of petrol vehicles in North Island towns. Certain industry sectors are under-represented, farming for example, while others such as taxis, building and manufacturing show relativel high penetration by CNG. CNG conversions are less likely in hatchbacks and large trucks, and in vehicles under 1300cc.

A comparison of vehicles by body style between the CNG Market Study and Wanganui Computer indicates a larger proportion of car types in the CNG Study sample and fewer light commercials. There is a significant difference between the two and, since it is based on population rather than sample data, the Wanganui Computer data must be taken as the more reliable. The detailed breakdowns of body style in the CNG Study have therefore been factored accord ingly.

A14.4 Utilisation of CNG and LPG Vehicles

CNG and LPG vehicles rely on a higher-than-average utilisation to repay their installation cost. Table A14.7 shows the annual kilometres of travel run by respondents to the CNG Market Survey together with an estimate of total CNG travel volume. Privately-owned CNG vehicles travel substantially more than petrol vehicles; business-owned CNG vehicles also travel further than their petrol counterparts but the difference is less marked.

At present there is no comparable survey for LPG vehicles. It would be expected that LPG vehicles would show a higher annual travel than CNG, since this is required for an acceptable payback period. LPG is also expected to be more attractive to the business traveller than the average private motorist. An exception will be in the South Island where CNG is not available. Also, it is understood that there is a demand for LPG kits to fit out older private vehicles carrying or towing heavy loads.

LPG vehicle utilisation can be very approximately gauged from fuel sales and vehicle numbers. Industry sources estimate that some 50% of LPG is currently supplied to public refuellin stations. Of the remainder, the non-transport component has been taken at the mid-range of forecasts made in the LFTB New Zealand Markets for LPG report, (En-Consult Technology 1981), that is

TABLE A14.4 (Continued)
DISTRIBUTION OF CNG VEHICLES

Engine Size CC	Private Vehicles %	Private Vehicles Number	Business Vehicle %	Business Vehicle Number	Total %	Total Number
<1100	1.3	500	1.5	500	1.4	1,000
1101-1350	6.7	2,500	10.5	3,400	8.4	5,900
1351-1600	11.6	4,400	12.0	3,900	11.9	8,300
1601-2000	24.3	9,200	31.4	10,100	27.6	19,300
2001-3000	16.5	6,200	10.9	3,500	13.9	9,700
3001-6000	38.4	14,500	32.9	10,600	35.9	25,100
>6000	1.0	400	0.8	300	1.0	700
All	100	37,800	100	32,200	100	70,000

Body Style	Private Vehicles %	Private Vehicles Number	Business Vehicle %	Business Vehicle Number	Total %	Total Number
Saloon	72.6	27,400	35.5	11,400	55.4	38,800
S/Wagon	13.3	5,000	14.8	4,800	14.0	9,800
Hatchback	3.8	1,400	1.2	400	2.6	1,800
Lt Van/Ute	3.5	1,300	11.8	3,800	7.3	5,100
Med Van/Ute	6.0	2,300	26.9	8,700	15.7	11,000
Med Truck	0.8	300	6.1	2,000	3.3	2,300
Truck/Bus	0.0	0	3.7	1,200	1.7	1,200
	100	37,800	100	32,200	100	70,000

TABLE A14.5
COMPARISON BETWEEN CNG MARKET STUDY AND WANGANUI COMPUTER DATA

Body Style	CNG Market Study	Wanganui Computer
Cars	72	65
Light CVs	23	30
Heavy CVs	5	5
All	100	100

Note: "Other" category excluded

23,000 tonnes/year (compared with an estimated 19,000 tonnes/year in 1981). This implies that of the 1984 total of 54,000 tonnes, the breakdown is:

50% to public LPG stations	27,000
to vehicles, private installations	4,000
to non-transport use	23,000
	54,000

Of the 31,000 tonnes to vehicles, some 3,000 is attributable to industrial (fork lift) trucks. The remainder, assuming an average fuel economy of 12.5 litres/100 km for the (mainly large) road vehicles at 1.25 litres petrol equivalent and 12,000 LPG vehicles on average for 1984, indicates an average utilisation of approximately 30,000 km/year.

Any further breakdown is rather conjectural, but assuming 500 LPG taxis and a division of 75% business and 25% private LPG vehicles, with the private vehicles running similar distances as the CNG fleet, the following assumptions follow:

		10^6 VKT
500 Taxis at 55,000 km	=	27.5
8,500 business vehicles at 31,700 km	=	269.8
3,000 private vehicles at 20,900 km	=	62.7
		360.0

TABLE A14.6 LPG VEHICLES - DISTRIBUTION BY BODY STYLE

	%	Number	Private	Business
Cars	63	7,800	3,000	4,800
Light CVs	26	3,300		3,300
Heavy CVs	7	900		900
Machines	4	500		500
All	96	12,500	3,000	9,500

A14.5 Fuel Use

1984 Fuel use by CNG and LPG vehicles is shown in Table A14.8 with a review of the growth of gas fuel use in transport in Table A14.9. Very rapid growth in the rate of substitution has occurred throughout the past eight years, averaging about 75% p.a. This has seen alternative fuels grow from a negligible share of the transport fuels market to the 1984 total of 240 million litres petrol equivalent, or 9% of the total market for petrol and gas fuels combined.

TABLE A14.7
CNG VEHICLES - ANNUAL TRAVEL

Annual Kms ('000s)		Private			Business			Total
Range	Mean	Vehicles %	Vehicles Number	Vehicle-kms (10^6)	Vehicles %	Vehicles Number	Vehicle-kms (10^6)	Vehicle-kms (10^6)
under 5	4	13.6	5,100	20	11.7	3,800	15	36
5 - 10	8	11.1	4,200	32	4.2	1,400	11	42
10 - 20	15	38.7	14,600	219	26.4	8,500	128	347
20 - 30	25	16.5	6,200	155	23.8	7,700	193	348
30 - 50	40	10.2	3,900	156	15.5	5,000	200	356
over 50	55	10.0	3,800	209	18.5	6,000	330	539
All		100	37,800	791	100	32,200	876	1,667
Mean Annual Kilometres				20,900			27,200	23,800

TABLE A14.8
CNG AND LPG USE IN VEHICLE, 1984

Description	CNG	LPG	Total
Number of road vehicles.....	70,000	12,000	82,000
Average annual kilometres.....	23,800	30,000	24,700
% running on gas fuel.....	93.5	100	
Total travel, million kilometres.	1,666	360	2,026
Travel on gas fuel.....	1,558	360	1,918
Fuel use:			
m3 or litres/100km.....	9.38	15.63	
MJ/100km.....	375	386	
m3 or litres (10^6).....	146	56	
PJ.....	5.84	1.39	7.23
Equiv. litres petrol (10^6)	195	45	240
Equivalent PJ petrol.....	6.31	1.46	7.77

Based on the following conversion factors:

Cu.m. CNG equivalent to 1 litre premium petrol.....	0.75
Litres LPG equivalent to 1 litre premium petrol....	1.25
Average petrol vehicle fuel economy, litres/100 km.	12.5
LPG energy content , MJ/litre.....	24.7
CNG energy content, MJ/cu m.....	40.0
Petrol energy content, MJ/litre.....	32.4
1 MJ of premium petrol substituted by MJ CNG.....	0.93
1 MJ of premium petrol substituted by MJ LPG.....	0.95

TABLE A14.9
CNG AND LPG FUEL USE IN VEHICLES - TIME SERIES

Year	PJ Gas Fuels			Amount of Petrol Substituted (PJ)			
	CNG	LPG	Total	CNG	LPG	PJ	Litres (10^
1985							
1984	4.04	1.39	5.43	4.36	1.46	5.82	180
1983	2.57	0.72	3.29	2.78	0.76	3.53	109
1982	1.17	0.56	1.73	1.26	0.59	1.85	57
1981	0.74	0.49	1.23	0.80	0.51	1.31	41
1980	0.20	0.37	0.57	0.22	0.39	0.60	19
1979	0.05	0.29	0.34	0.05	0.30	0.36	11
1978		0.22	0.22		0.23	0.23	7
1977		0.17	0.17		0.18	0.18	6
1976		0.09	0.09		0.09	0.09	3